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Notes:

1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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[Document Name]Description

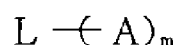
[Title of the Invention]Light emitting element

[Claim(s)]

[Claim 1]A light emitting element being a compound by which at least one sort of this electronic transportation material is expressed with following general formula (I) in a light emitting element which has two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[Chemical formula 1]

一般式 (I)



(A hetero ring machine which A expresses among a formula a hetero ring machine which two or more aromatic series rings condensed, and is denoted by A may be the same or different.)
m expresses an integer greater than or equal to 2. L expresses a connection machine.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the light emitting element which can use electric energy about the light emitting element which changes into light and can emit light conveniently for fields, such as a display element, a display, backlight, electro photography, the source of the illumination light, a record light source, an exposure light source, a reading light source, a sign, a signboard, interior design, and an optical-communications device.

[0002]

[Description of the Prior Art] The research and development about various display elements are active, and especially, since the organic electric field luminescence (EL) element can obtain high-intensity luminescence by the low voltage, it attracts attention as a promising display element today. For example, the light emitting element which forms an organic thin film by vapor deposition of an organic compound is known (applied physics Letters, 51 volumes, 913 pages, 1987). The light emitting element indicated in this literature is raising luminescent property sharply compared with the conventional monolayer type element by making it laminate with electron hole transportation material (amine compound), using a tris (8-hydroxyquinolate) aluminium complex (Alq) as an electronic transportation material.

[0003] The method of doping a fluorescence pigment is known by making luminous efficiency of the above-mentioned laminated type light emitting element into a means to improve further. For example, journal OBU Applied Physics Compared with the element which is not doped, luminous efficiency of 65 volumes, 3610 pages, and the light emitting element that doped the Kumarin pigment of the description in 1989 is improving sharply. In this case, although it is possible to take out the light of a desired wavelength by changing the kind of fluorogenic compound to be used, Since green luminescence of Alq other than luminescence of the doped fluorogenic compound will be observed if drive voltage is made high in order to obtain high-intensity when Alq is used as an electronic transportation material, In making blue emit light, the fall of color purity becomes a problem, and development of the host material who does not reduce color purity is desired. Although indole derivatives specific to JP,H10-92578,A and U.S. Pat. No. 5766779 as what improves this are indicated, With the compound of the description,

there are problems, like there is the necessity of making drive voltage high, for high-intensity luminescence, and development of the compound in which high-intensity luminescence is possible was desired by the low voltage. moreover -- as the method of raising luminous efficiency -- 3-(4-biphenyl)-4-phenyl 5-(4-tert-buthylphenyl)-1, and 2 and 4 - doria, although the method of using hole block materials, such as ZORU (TAZ) and bathocuproine (BCP), is reported, With these publicly known materials, element degradation by endurance especially high temperature preservation temporality, and continuation luminescence had become a big problem. Although the method of doping Li etc. as art which drops drive voltage into electronic transportation materials, such as a method, Alq, etc. which use a silole system compound and organic carboxylic acid alkali metal salt as an electronic injection layer, was indicated, each of such art has insufficient endurance, and practical use could not be presented with it.

[0004]On the other hand, although what has realized high-intensity luminescence in an organic light emitting element is an element which has laminated the organic substance by vacuum deposition, element production by the application method from viewpoints of simplification of a manufacturing process, processability, large-area-izing, etc. is desirable. However, with the element produced by the conventional application method, it is inferior to luminescence luminosity and the element produced by the vapor deposition method in respect of luminous efficiency, and high-intensity and efficient light-ization had become a big technical problem.

[0005]

[Problem to be solved by the invention]High-intensity and efficient light are possible for the first purpose of this invention by the low voltage, and it is in offer of a light emitting element excellent in the stability in the time of repetition use. The second purpose of this invention is in offer of a light emitting element excellent in color purity.

[0006]

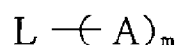
[Means for solving problem]This technical problem was attained by the following means.

[0007](1) The light emitting element containing at least one sort of compounds denoted by following general formula (I) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0008]

[Chemical formula 2]

一般式 (I)

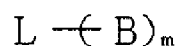


[0009](The hetero ring machine which A expresses among a formula the hetero ring machine which two or more aromatic series rings condensed, and is denoted by A may be the same or different.) m expresses an integer greater than or equal to 2. L expresses a connection machine. (2) Light emitting element given in (1) containing at least one sort of compounds denoted by following general formula (II) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0010]

[Chemical formula 3]

一般式 (II)

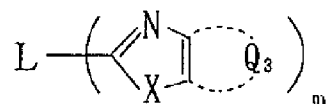


[0011](The hetero ring machine which B expresses among a formula the hetero ring machine which the aromatic series ring of two or more five-membered rings and/or six membered-rings condensed, and is denoted by B may be the same or different.) m expresses an integer greater than or equal to 2. L expresses a connection machine. (3) Light emitting element given in (2) containing at least one sort of compounds denoted by following general formula (III) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0012]

[Chemical formula 4]

一般式 (III)

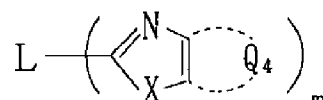


[0013](X express O, S, Se, Te, or N-R among a formula.) R expresses a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine. Q₃ expresses an atomic group required to form an aromatic series ring. m expresses an integer greater than or equal to 2. L expresses a connection machine. (4) Light emitting element given in (3) containing at least one sort of compounds denoted by following general formula (IV) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0014]

[Chemical formula 5]

一般式 (IV)

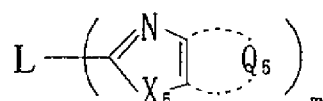


[0015](X express O, S, Se, Te, or N-R among a formula.) R expresses a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine. Q_4 expresses an atomic group required to form a nitrogen-containing aromatic series hetero ring. m expresses an integer greater than or equal to 2. L expresses a connection machine. (5) Light emitting element given in (4) containing at least one sort of compounds denoted by following general formula (V) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0016]

[Chemical formula 6]

一般式 (V)



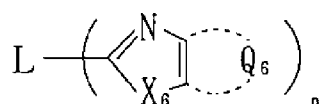
[0017](X_5 expresses O, S, or N-R among a formula.) R expresses a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine. Q_5 expresses an atomic group required to form the nitrogen-containing aromatic series hetero ring of 6 members. m expresses an integer greater than or equal to 2. L expresses a connection machine. (6) Light emitting element given in (5) containing at least one sort of compounds

denoted by following general formula (VI) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0018]

[Chemical formula 7]

一般式 (VI)

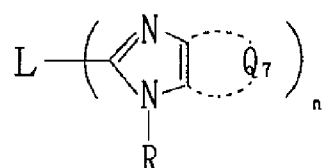


[0019](X₆ expresses O, S, or N-R among a formula.) R expresses a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine. Q₆ expresses an atomic group required to form the nitrogen-containing aromatic series hetero ring of 6 members. n expresses the integer of 2 thru/or 8. L expresses a connection machine. (7) Light emitting element given in (6) containing at least one sort of compounds denoted by following general formula (VII) in the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials.

[0020]

[Chemical formula 8]

一般式 (VII)

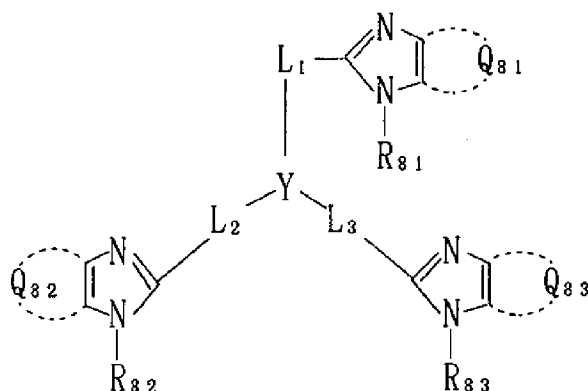


[0021](R expresses a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine among a formula.) Q_7 expresses an atomic group required to form the nitrogen-containing aromatic series hetero ring of 6 members. n expresses the integer of 2 thru/or 8. L expresses a connection machine. (8) In the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials, A light emitting element given in (7) containing at least one sort of compounds denoted by following general formula (VIII).

[0022]

[Chemical formula 9]

一般式 (VIII)

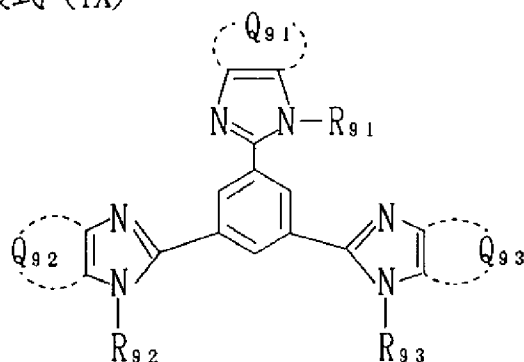


[0023]the inside of a formula, Q_{81} , and Q_{82} -- reaching -- Q_{83} expresses an atomic group required to form the nitrogen-containing aromatic series hetero ring of 6 members, respectively. R_{81} , R_{82} , and R_{83} express a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine, respectively. L_1 , L_2 , and L_3 express a connection machine, respectively. Y expresses a nitrogen atom or an aromatic series ring. (9) In the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials, A light emitting element given in (8) containing at least one sort of compounds denoted by following general formula (IX).

[0024]

[Chemical formula 10]

一般式 (IX)

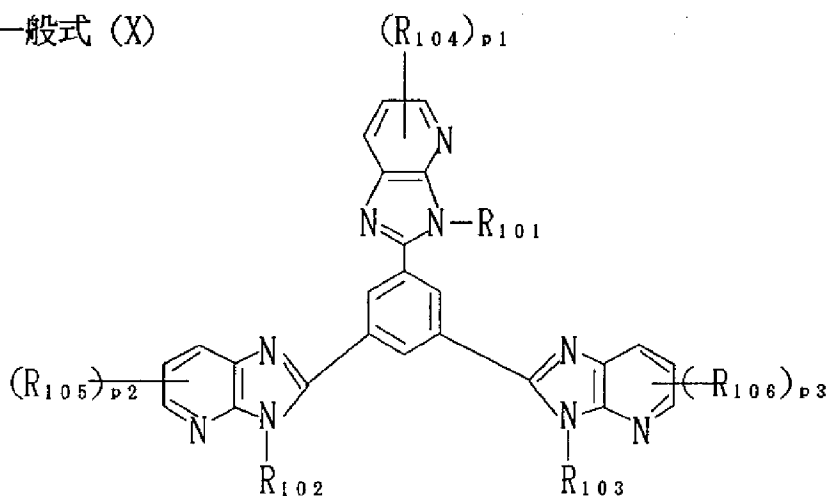


[0025]the inside of a formula, Q_{91} , and Q_{92} -- reaching -- Q_{93} expresses an atomic group required to form the nitrogen-containing aromatic series hetero ring of 6 members, respectively. [R_{91} , R_{92} , and R_{93}] A hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine is expressed, respectively. (10) In the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials, A light emitting element given in (9) containing at least one sort of compounds denoted by following general formula (X).

[0026]

[Chemical formula 11]

一般式 (X)

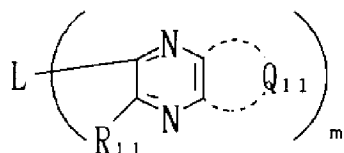


[0027] (R_{101} , R_{102} , and R_{103} express a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine among a formula, respectively.) R_{104} , R_{105} , and R_{106} express a substituent, respectively. p_1 , p_2 , and p_3 express the integer of 0 thru/or 3, respectively. (11) In the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials, A light emitting element given in (2) containing at least one sort of compounds denoted by following general formula (XI).

[0028]

[Chemical formula 12]

一般式 (XI)

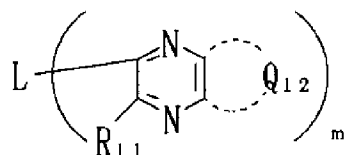


[0029](Q_{11} expresses an atomic group required to form an aromatic series ring among a formula.) R_{11} expresses a hydrogen atom or a substituent. m expresses an integer greater than or equal to 2. L expresses a connection machine. (12) In the light emitting element which formed two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials, A light emitting element given in (11) containing at least one sort of compounds denoted by following general formula (XII).

[0030]

[Chemical formula 13]

一般式 (XII)



[0031](Q_{12} expresses an atomic group required to form an aromatic series hetero ring among a formula.) R_{11} expresses a hydrogen atom or a substituent. m expresses an integer greater than or equal to 2. L expresses a connection machine. Light emitting element given in either of (13) (1), wherein this electron transport layer consists of more than two-layer in light emitting element in which two or more organic compound layers which contain luminous layer and

electron transport layer in inter-electrode [a pair of] were formed - (12). (14) A light emitting element given in either of (1) - (13), wherein this luminous layer contains a phosphorescence luminescence compound in the light emitting element in which two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [which is one pair] were formed. (15) In the light emitting element in which two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of] were formed, said -- a general formula -- (I) - (XII) -- expressing -- having -- a compound -- at least -- one -- a sort -- others -- an electron -- transportation -- material -- the same -- a layer -- inside -- containing -- things -- the feature -- carrying out -- (-- one --) - (-- 14 --) -- either -- a description -- a light emitting element . (16) In the light emitting element in which two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of] were formed, this -- an electron transport layer -- two-layer -- the above -- from -- becoming -- an electron transport layer -- at least -- one -- a layer -- said -- a general formula -- (I) - (XII) -- expressing -- having -- a compound -- at least -- one -- a sort -- containing -- and -- others -- an electron transport layer -- others -- an electron - - transportation -- material -- containing -- things -- the feature -- carrying out -- (-- one --) - (-- 15 --) -- either -- a description -- a light emitting element . (17) one -- a pair -- inter-electrode -- a luminous layer -- an electron transport layer -- containing -- plurality -- an organic compound -- a layer -- having formed -- a light emitting element -- setting -- said -- a general formula -- (I) - (XII) -- expressing -- having -- a compound -- at least -- two -- a sort -- containing -- things -- the feature -- carrying out -- (-- one --) - (-- 16 --) -- either -- a description -- a light emitting element . (18) In the light emitting element which forms two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contains two or more sorts of electronic transportation materials, A light emitting element given in either of (1) - (17), wherein at least one layer which is this electron transport layer is a layer which distributed to polymer at least one sort of a compound denoted by said general formula (I) - (XII). (19) In the light emitting element which forms two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contains two or more sorts of electronic transportation materials, A light emitting element given in either of (1) - (18), wherein a blue luminous layer and at least one layer [the negative pole] of a between are layers containing at least one sort of compounds denoted by said general formula (I) - (XII). (20) In the light emitting element which has a luminous layer and an electron transport layer in inter-electrode [of an anode and the negative pole / at least a pair of], [between the layer and the negative pole containing the compound which has a layer more than two-layer between a luminous layer and the negative pole, and contains at least one sort of compounds expressed with said general formula (I) - (XII) to the layer which touches a luminous layer, and is denoted by general formula (I) - (XII)] A light emitting element

given in either of (1) - (19) having a layer containing a compound with larger electron affinity than the compound denoted by general formula (I) - (XII).

[0032]

[Mode for carrying out the invention] Hereafter, this invention is explained in detail. First, the compound denoted by general formula (I) is explained. The hetero ring machine which A expresses the hetero ring machine which two or more aromatic series rings condensed, and is denoted by A may be the same or different. The aromatic series hetero ring of a five-membered ring or six membered-rings condenses preferably as a hetero ring machine denoted by A, and 2 thru/or 3 aromatic series hetero rings [two] condense 2 thru/or 6 pieces preferably especially still more preferably. Preferably as a hetero atom in this case, it is N, O, S, Se, and Te atom, is N, O, and S atom more preferably, and is N atom still more preferably. [as an example of the aromatic series ring which constitutes the hetero ring machine denoted by A] For example, benzene, a franc, CHIOFEN, Piran, pyrrole, imidazole, PIRAZORU, pyridine, pyrazine, pyrimidine, PIRIDAJIN, thia ZORU, OKISAZORU, isothiazole, ISOOKI Southall, thiadiazole, oxadiazole and doria, [ZORU, selenazole, tetrazole etc.] [mention and] It is imidazole, PIRAZORU, pyridine, pyrazine, pyrimidine, PIRIDAJIN, thia ZORU, and OKISAZORU preferably, and they are imidazole, thia ZORU, OKISAZORU, pyridine, pyrazine, pyrimidine, and PIRIDAJIN more preferably.

[0033] As an example of a condensed ring denoted by A, for example Benzofuran, benzothiophene, Indore, indazole, iso benzofuran, benzimidazole. ** NZOTORIAZORU, benzoxazole, BENZUCHIAZORU, BENZU selenazole, BENZU tetrazole, indolizine, a pudding, pteridine, Calvo Lynne, pyrrolo imidazole and pyrrolo -- doria -- ZORU and pyrazolo imidazole. pyrazolo -- doria -- ZORU, pyrazolo pyrimidine, and pyrazolo triazine. triazolo pyridine, TETORAZA indene, and pyrrolo imidazole -- and, [pyrrolo doria] Imidazo imidazole, imidazopyridine, imidazo pyrazine, imidazo pyrimidine, Imidazo PIRIDAJIN, oxazolo pyridine, oxazolo pyrazine, oxazolo pyrimidine, Oxazolo PIRIDAJIN, thia ZOROPI lysine, CHIAZORO pyrazine, CHIAZORO pyrimidine, Thia ZOROPIRIDAJIN, pyridino pyrazine, pyrazino pyrazine, pyrazino PIRIDAJIN, NAFUCHI lysine, imidazo triazine, etc. are mentioned and preferably Imidazopyridine, imidazo pyrazine, imidazo pyrimidine, imidazo PIRIDAJIN, oxazolo pyridine, oxazolo pyrazine, oxazolo pyrimidine, Oxazolo PIRIDAJIN, thia ZOROPI lysine, CHIAZORO pyrazine, CHIAZORO pyrimidine, It is thia ZOROPIRIDAJIN, pyridino pyrazine, and pyrazino

pyrazine, is imidazopyridine, oxazolo pyridine, thia ZOROPi lysine, pyridino pyrazine, and pyrazino pyrazine still more preferably, and is imidazopyridine especially preferably.

[0034]The hetero ring machine denoted by A may be condensed with the ring of further others, and may have a substituent. as the substituent of a hetero ring machine denoted by A -- an alkyl group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-10 preferably, and especially) For example, methyl, ethyl, iso-propyl, tert-butyl, n-octyl, n-DESHIRU, n-hexadecyl, cyclo propyl, cyclopentyl, cyclohexyl etc. are mentioned -- an alkenyl group (desirable -- the carbon numbers 2-30 -- more -- desirable -- the carbon numbers 2-20 -- it being the carbon numbers 2-10 preferably, and especially) for example, vinyl, ARIRU, 2-butenyl, 3-pentenyl, etc. are mentioned. an alkynyl group (desirable -- the carbon numbers 2-30 -- more -- desirable -- the carbon numbers 2-20 -- it being the carbon numbers 2-10 preferably, and especially) for example, propargyl, 3-pliers nil, etc. are mentioned -- an aryl group (desirable -- the carbon numbers 6-30 -- more -- desirable -- the carbon numbers 6-20 -- it being the carbon numbers 6-12 preferably, and especially) for example, a phenyl, p-methylphenyl, Naff Chill, etc. are mentioned -- an amino group (desirable -- the carbon numbers 0-30 -- more -- desirable -- the carbon numbers 0-20 -- they are the carbon numbers 0-10 especially preferably -- for example, amino ** methylamino, dimethylamino, and diethylamino.) dibenzylamino, diphenylamino, ditolylamino, etc. are mentioned. an alkoxy group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-10 preferably, and especially) for example, methoxy ones, ethoxy ** butoxy, 2-ECHIRUHEKI siloxy, etc. are mentioned. an aryloxy group (desirable -- the carbon numbers 6-30 -- more -- desirable -- the carbon numbers 6-20 -- it being the carbon numbers 6-12 preferably, and especially) for example, phenyloxy, 1-naphthyloxy, 2-naphthyloxy, etc. are mentioned. a hetero ring OKISHI machine (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, pyridyloxy, pyrazyl OKISHI, pyrimidyl OKISHI, quinolyl OKISHI, etc. are mentioned. a silyloxy machine (desirable -- the carbon numbers 3-40 -- it being the carbon numbers 6-30 more preferably, and) For example, bird phenyl silyloxy, t-butyl dimethylsilyloxy, triisopropyl silyloxy etc. are mentioned -- an acyl group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- they are the carbon numbers 2-12 especially preferably -- for example, ASECHIRU and benzoyl --) [HORUMIRU and] pivaloyl etc. are mentioned -- an alkoxycarbonyl group (desirable -- the carbon numbers 2-30 -- more -- desirable -- the carbon numbers 2-20 -- it being the carbon numbers 2-12 preferably, and especially) for example, methoxy carbonyl, ethoxycarbonyl, etc. are mentioned. an aryloxy carbonyl group (desirable -- the carbon numbers 7-30 -- more --

desirable -- the carbon numbers 7-20 -- it being the carbon numbers 7-12 preferably, and especially) for example, phenyloxy carbonyl etc. are mentioned -- a reed RUOKISHI machine (desirable -- the carbon numbers 2-30 -- more -- desirable -- the carbon numbers 2-20 -- it being the carbon numbers 2-10 preferably, and especially) for example, acetoxo, benzoyloxy one, etc. are mentioned -- the acylamino machine (desirable -- the carbon numbers 2-30 -- more -- desirable -- the carbon numbers 2-20 -- it being the carbon numbers 2-10 preferably, and especially) for example, acetylamino, benzoylamino, etc. are mentioned -- an alkoxycarbonylamino machine (desirable -- the carbon numbers 2-30 -- more -- desirable -- the carbon numbers 2-20 -- it being the carbon numbers 2-12 preferably, and especially) for example, methoxycarbonylamino etc. are mentioned -- an aryloxycarbonylamine machine (desirable -- the carbon numbers 7-30 -- more -- desirable -- the carbon numbers 7-20.) especially, it is the carbon numbers 7-12 preferably, for example, phenyloxy carbonylamino etc. are mentioned. a sulfonylamino machine (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, methanesulfonylamino, benzenesulphonyl amino, etc. are mentioned. a sulfamoyl group (desirable -- the carbon numbers 0-30 -- more -- desirable -- the carbon numbers 0-20 -- it being the carbon numbers 0-12 preferably, and especially) For example, sulfamoyl, methyl sulfamoyl, JIMECHIRU sulfamoyl, phenyl sulfamoyl etc. are mentioned -- a carbamoyl group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) For example, Culver Moyle, methylcarbamoyl, diethylcarbamoyl, phenylcarbamoyl etc. are mentioned -- an alkylthio group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, MECHIRUCHIO, ECHIRUCHIO, etc. are mentioned -- an arylthio group (desirable -- the carbon numbers 6-30 -- more -- desirable -- the carbon numbers 6-20 -- it being the carbon numbers 6-12 preferably, and especially) for example, phenylthio etc. are mentioned -- a hetero ring thio group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, pillage RUCHIO, 2-BENZUOKISAZORIRUCHIO, 2-BENZUCHIAZORIRUCHIO, etc. are mentioned. a sulfonyl group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, MESHIRU, TOSHIRU, etc. are mentioned -- a sulfinyl group (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, methane SURUFINIRU, benzene SURUFINIRU, etc. are mentioned. a UREIDO machine (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, UREIDO, MECHIRUU RAID, phenyl RAID, etc. are mentioned. an

amide phosphate machine (desirable -- the carbon numbers 1-30 -- more -- desirable -- the carbon numbers 1-20 -- it being the carbon numbers 1-12 preferably, and especially) for example, JIECHIRURIN acid amide, phenyl amide phosphate, etc. are mentioned -- a hydroxy group, a mercapto group, and a halogen atom (for example, a fluorine atom, a chlorine atom, and a bromine atom.) An iodine atom, a cyano group, a sulfonic group, a carboxyl group, a nitro group, a hydroxamic acid machine, a SURUFINO machine, a hydrazino machine, an imino group, and a hetero ring machine (desirable -- the carbon numbers 1-30 -- it being the carbon numbers 1-12 more preferably, and as a hetero atom) On a nitrogen atom, an oxygen atom, a sulfur atom, and a concrete target, for example, for example, imidazolyl, Pyridyl, quinolyl, a frill, thienyl one, piperidyl, morpholino, BENZU oxazolyl, benzimidazolyl, BENZU thiazolyl, carbazolyl, AZEPINIRU etc. are mentioned. A silyl group (desirable -- the carbon numbers 3-40 -- more -- desirable -- the carbon numbers 3-30 -- especially, it is the carbon numbers 3-24 preferably, for example, trimethylsilyl, bird phenyl silyl, etc. are mentioned.) etc. are mentioned. These substituents may be replaced further. when there are two or more substituents, it may be the same or may differ. When possible, it may connect and a ring may be formed.

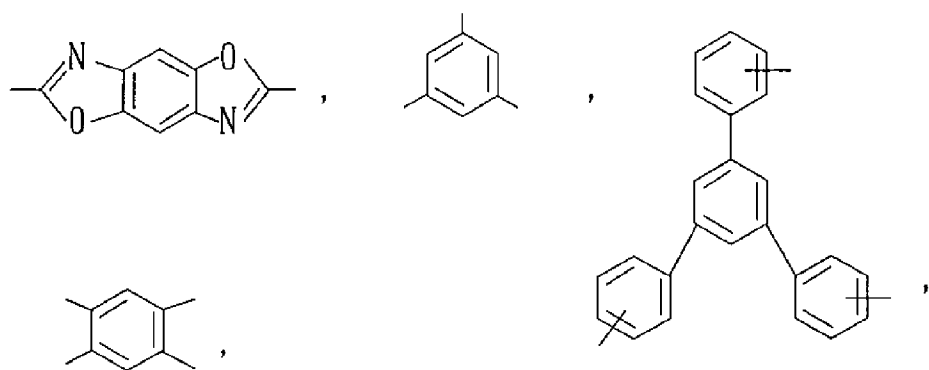
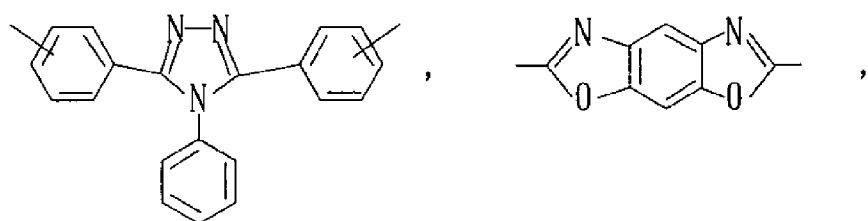
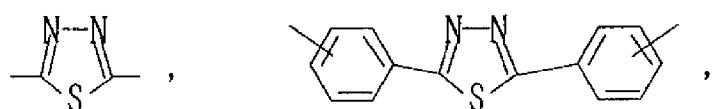
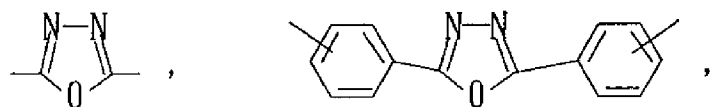
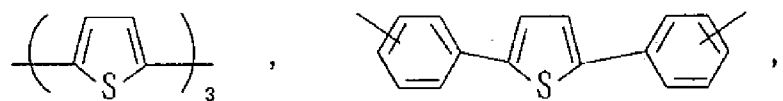
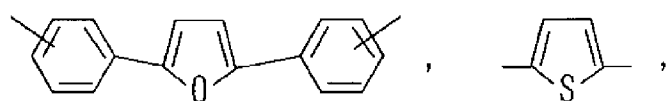
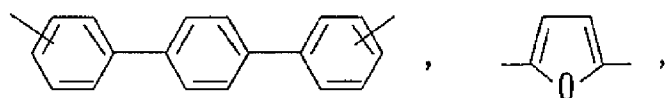
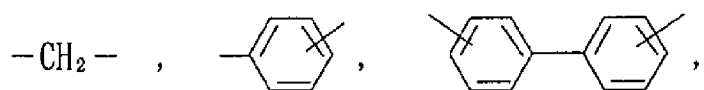
[0035]As a substituent of a hetero ring machine denoted by A, preferably, An alkyl group, an alkenyl group, an alkynyl group, an aryl group, an amino group, An alkoxy group, an aryloxy group, an acyl group, an alkoxycarbonyl group, An aryloxy carbonyl group, a reed RUOKISHI machine, the acylamino machine, an alkoxycarbonylamino machine, An aryloxycarbonylamine machine, a sulfonylamino machine, a sulfamoyl group, A carbamoyl group, an alkylthio group, an arylthio group, a sulfonyl group, Are a halogen atom, a cyano group, and a hetero ring machine, and more preferably An alkyl group, An alkenyl group, an aryl group, an alkoxy group, an aryloxy group, a halogen atom, It is a cyano group and a hetero ring machine, and is an alkyl group, an aryl group, an alkoxy group, an aryloxy group, and an aromatic series hetero ring machine still more preferably, and they are an alkyl group, an aryl group, an alkoxy group, and an aromatic series hetero ring machine especially preferably. m expresses an integer greater than or equal to 2 -- desirable -- 2 thru/or 8 -- more -- desirable -- 2 thru/or 6 -- it is 2 thru/or 4 still more preferably, is 2 or 3 especially preferably, and is 3 most preferably. L expresses a connection machine. As a connection machine denoted by L, preferably A single bond, C, N, O, S, Si, Are a connection machine formed in germanium etc. and more preferably A single bond, an alkylene, Alkenylene, alkynylene, Ally Wren, the hetero ring of 2 values (it is an aromatic series hetero ring preferably, and) It is an aromatic series hetero ring etc. which are more preferably formed from AZORU, CHIOFEN, and a furan ring. And it is a basis which comprises N and such combination, and is a basis which comprises the aromatic series hetero

ring of Ally Wren and 2 values, and N and such combination still more preferably.

[0036]As an example of a connection machine denoted by L, the thing of everything but a single bond, for example, the following, is mentioned.

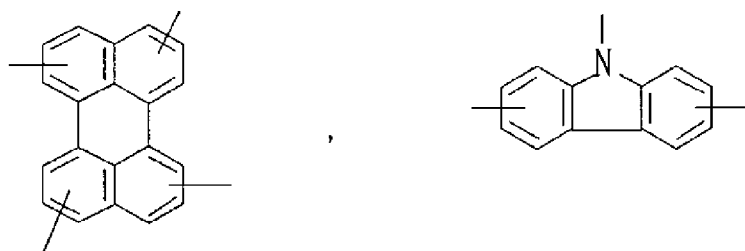
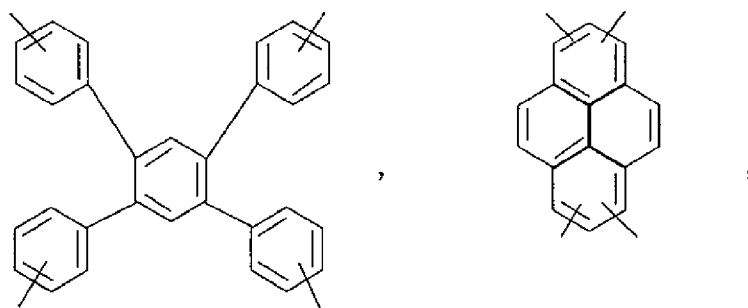
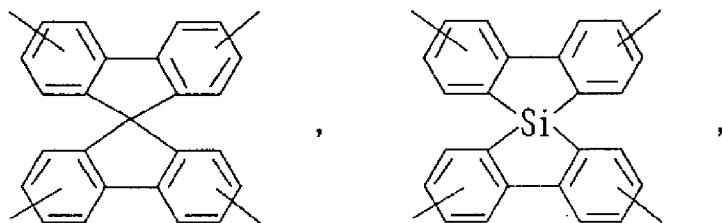
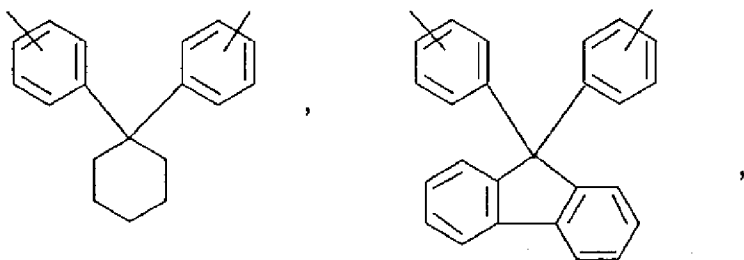
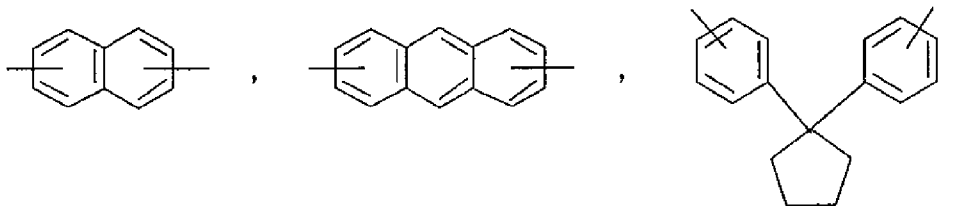
[0037]

[Chemical formula 14]



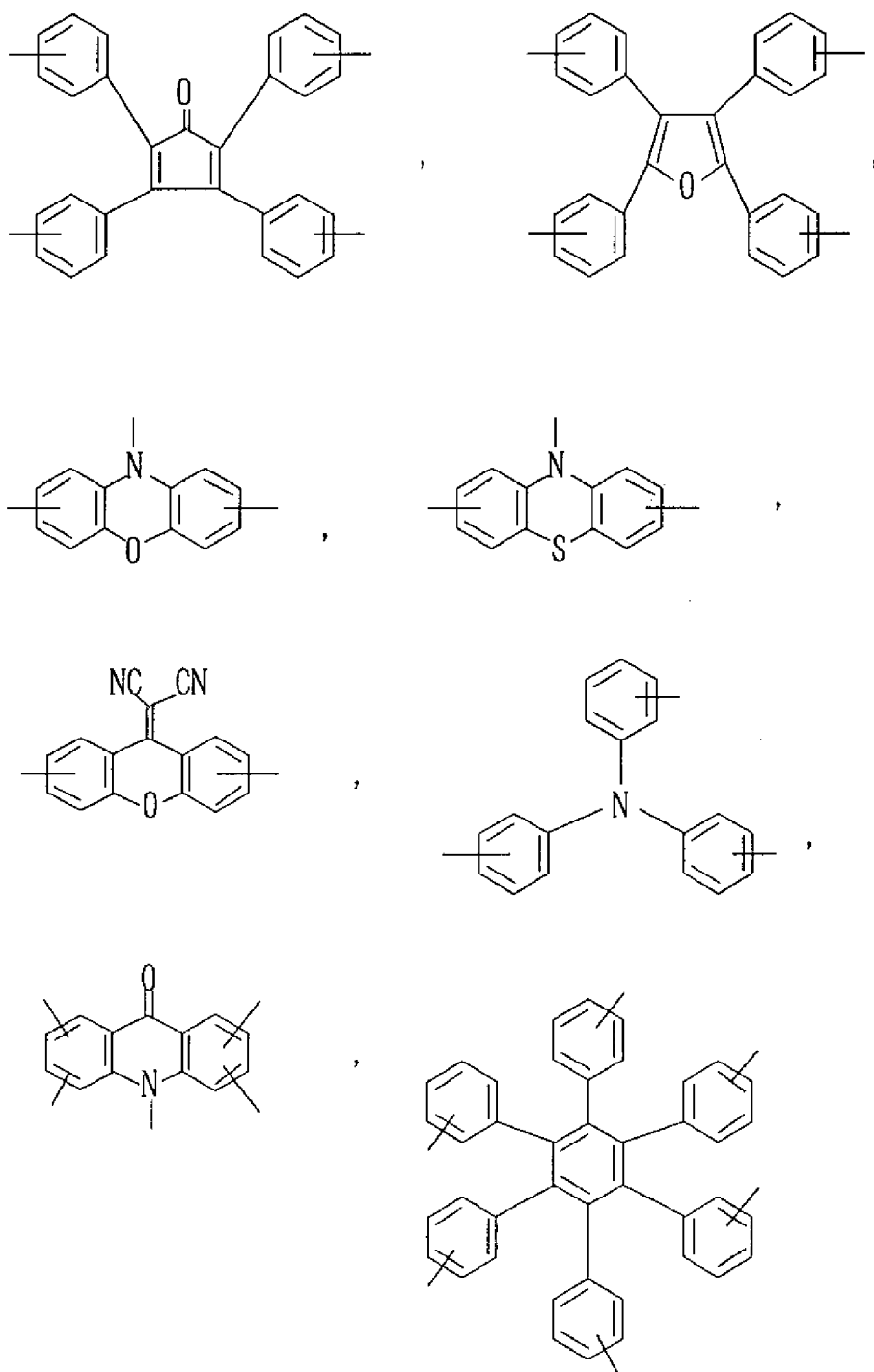
[0038]

[Chemical formula 15]



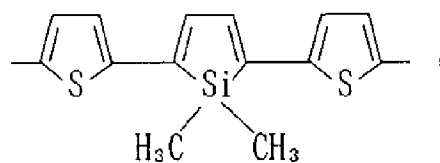
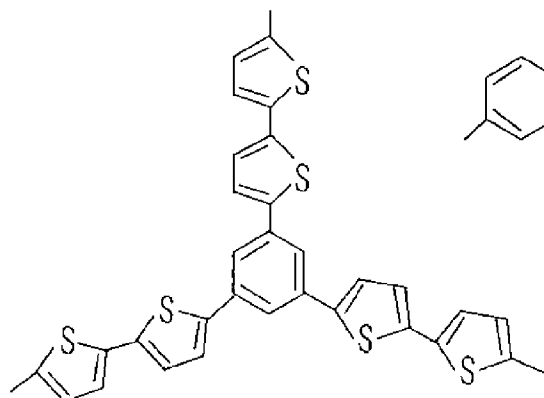
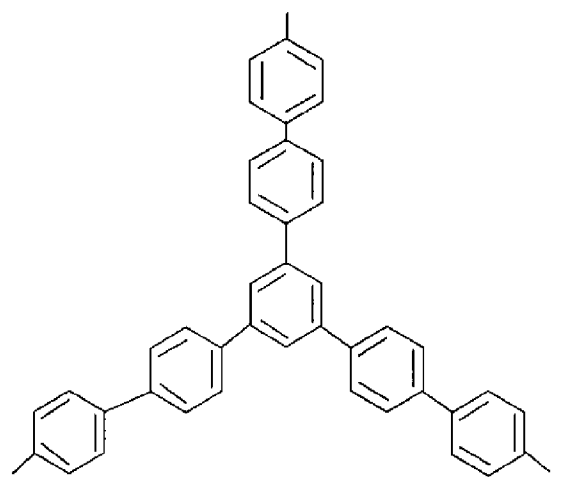
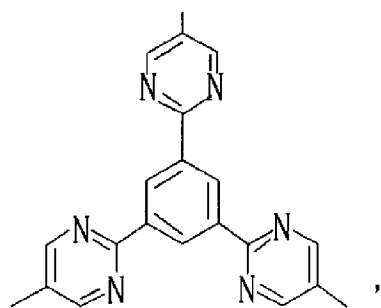
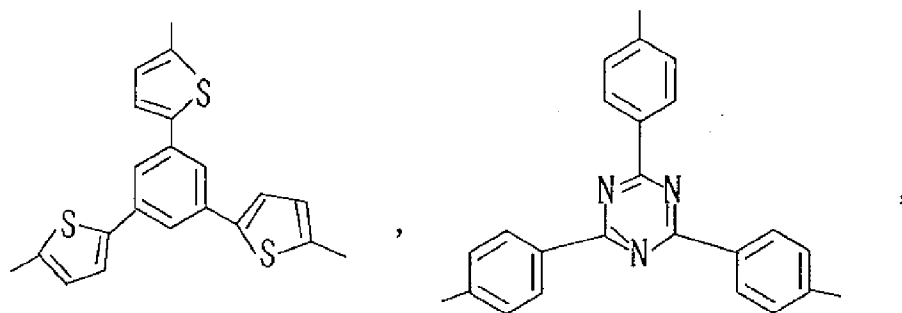
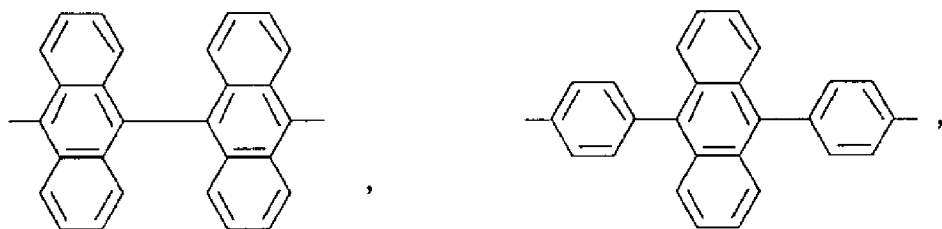
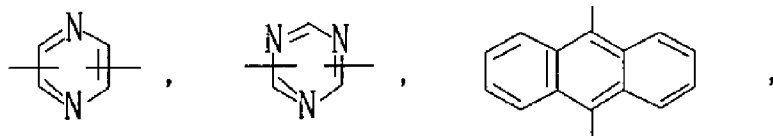
[0039]

[Chemical formula 16]



[0040]

[Chemical formula 17]



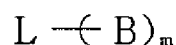
[0041]The connection machine denoted by L may have a substituent, and can apply the thing quoted as a substituent of a hetero ring machine denoted by A as a substituent. Preferably as a substituent of L An alkyl group, an alkenyl group, an alkynyl group, An aryl group, an alkoxy group, an aryloxy group, an acyl group, a halogen atom, It is a cyano group, a hetero ring machine, and a silyl group, and is an alkyl group, an alkenyl group, an alkynyl group, an aryl group, an alkoxy group, an aryloxy group, a halogen atom, a cyano group, and an aromatic series hetero ring machine more preferably, and they are an alkyl group, an aryl group, and an aromatic series hetero ring machine still more preferably.

[0042]It is a compound preferably denoted by following general formula (II) among the compounds denoted by general formula (I).

[0043]

[Chemical formula 18]

一般式 (II)



[0044]The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively among a formula. The hetero ring machine which B expresses the hetero ring machine which the aromatic series ring of two or more five-membered rings and/or six membered-rings condensed, and is denoted by B may be the same or different. 2 thru/or 6 aromatic series rings of a five-membered ring or six membered-rings condense preferably as a hetero ring machine denoted by B, and two aromatic series hetero rings condense 2 thru/or 3 pieces preferably especially still more preferably. Preferably as a hetero atom in this case, it is N, O, S, Se, and Te atom, is N, O, and S atom more preferably, and is N atom still more preferably. [as an example of the aromatic series ring which constitutes the hetero ring machine denoted by B] For example, benzene, a franc, CHIOFEN, Piran, pyrrole, imidazole,

PIRAZORU, pyridine, pyrazine, pyrimidine, PIRIDAJIN, thia ZORU, OKISAZORU, isothiazole, ISOOKI Southall, thiadiazole, oxadiazole and doria, [ZORU, selenazole, tetrazole etc.] [mention and] It is imidazole, PIRAZORU, pyridine, pyrazine, pyrimidine, PIRIDAJIN, thia ZORU, and OKISAZORU preferably, and they are imidazole, thia ZORU, OKISAZORU, pyridine, pyrazine, pyrimidine, and PIRIDAJIN more preferably.

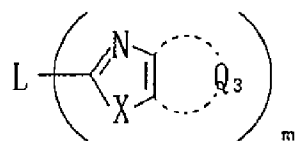
[0045]As an example of a condensed ring denoted by B, for example Benzofuran, benzothiophene, Indore, indazole, iso benzofuran, benzimidazole. ** NZOTORIAZORU, benzoxazole, BENZUCHIAZORU, BENZU selenazole, BENZU tetrazole, indolizine, a pudding, pteridine, Calvo Lynne, pyrrolo imidazole and pyrrolo -- doria -- ZORU and pyrazolo imidazole. pyrazolo -- doria -- ZORU, pyrazolo pyrimidine, and pyrazolo triazine. triazolo pyridine, TETORAZA indene, and pyrrolo imidazole -- and, [pyrrolo doria] Imidazo imidazole, imidazopyridine, imidazo pyrazine, imidazo pyrimidine, Imidazo PIRIDAJIN, oxazolo pyridine, oxazolo pyrazine, oxazolo pyrimidine, Oxazolo PIRIDAJIN, thia ZOROPI lysine, CHIAZORO pyrazine, CHIAZORO pyrimidine, Thia ZOROPIRIDAJIN, pyridino pyrazine, pyrazino pyrazine, pyrazino PIRIDAJIN, NAFUCHI lysine, imidazo triazine, etc. are mentioned and preferably Imidazopyridine, imidazo pyrazine, imidazo pyrimidine, imidazo PIRIDAJIN, oxazolo pyridine, oxazolo pyrazine, oxazolo pyrimidine, Oxazolo PIRIDAJIN, thia ZOROPI lysine, CHIAZORO pyrazine, CHIAZORO pyrimidine, It is thia ZOROPIRIDAJIN, pyridino pyrazine, and pyrazino pyrazine, is imidazopyridine, oxazolo pyridine, thia ZOROPI lysine, pyridino pyrazine, and pyrazino pyrazine still more preferably, and is imidazopyridine especially preferably. The hetero ring machine denoted by B may have a substituent, and can apply the thing quoted as a substituent of a hetero ring machine denoted by A in general formula (I) as a substituent, and its desirable substituent is also the same.

[0046]It is a compound more preferably denoted by following general formula (III) or (XI) among the compounds denoted by general formula (I).

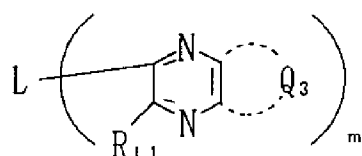
[0047]

[Chemical formula 19]

一般式 (III)



一般式 (XI)



[0048] General formula (III) is explained. The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively. X expresses O, S, Se, Te, or N-R. R expresses a hydrogen atom, an aliphatic hydrocarbon machine, an aryl group, or a hetero ring machine. Q₃ expresses an atomic group required to form an aromatic series hetero ring. As an aliphatic hydrocarbon machine denoted by R, preferably, an alkyl group (desirable -- the carbon numbers 1-20 -- more -- desirable -- the carbon numbers 1-12 -- it being the carbon numbers 1-8 preferably, and especially) For example, methyl, ethyl, iso-propyl, tert-butyl, n-octyl, n-DESHIRU, n-hexadecyl, cyclo propyl, cyclopentyl, cyclohexyl etc. are mentioned -- an alkenyl group (desirable -- the carbon numbers 2-20 -- more -- desirable -- the carbon numbers 2-12 -- it being the carbon numbers 2-8 preferably, and especially) for example, vinyl, ARIRU, 2-butenyl, 3-pentenyl, etc. are mentioned. it is an alkynyl group (desirable -- the carbon numbers 2-20 -- more -- desirable -- the carbon numbers 2-12 -- especially, it is the carbon numbers 2-8 preferably, for example, propargyl, 3-pliers nil, etc. are mentioned.), and they are an alkyl group and an alkenyl group more preferably.

[0049] as the aryl group denoted by R -- desirable -- the carbon numbers 6-30 -- more -- desirable -- the carbon numbers 6-20 -- it being the carbon numbers 6-12 preferably, and especially, For example, a phenyl, 2-methylphenyl, 3-methylphenyl, 4-methylphenyl, 4-methoxyphenyl, 3-trifluoro methylphenyl, pentafluorophenyl, 2-biphenyl, 3-biphenyl, 4-biphenyl, 1-Naff Chill, 2-Naff Chill, 1-pyrenyl, etc. are mentioned. The hetero ring machine denoted by R is a hetero ring machine (preferably the carbon numbers 1-20, preferably the

carbon numbers 1-12, still more preferably hetero ring machine of the carbon numbers 2-10) of a monocycle or a condensed ring, It is an aromatic series hetero ring machine which contains at least one of a nitrogen atom, an oxygen atom, a sulfur atom, and the selenium atoms preferably. As an example of a hetero ring machine denoted by R, for example Pyrrolidine, piperidine, Pyrrole, a franc, CHIOFEN, imidazoline, imidazole, benzimidazole. Naphth imidazole, thiazolidine, thia ZORU, BENZUCHIAZORU, Naphthothiazole, isothiazole, oxazoline, OKISAZORU, Benzoxazole, NAFUTOOKI Southall, ISOOKI Southall, selenazole, BENZU selenazole, naphthoselenazole, pyridine, quinoline, iso quinoline, Indore, India renin, PIRAZORU, pyrazine, pyrimidine, PIRIDAJIN, Triazine, indazole, a pudding, lid RAJIN, NAFUCHI lysine, quinoxaline, Quinazoline, cinnoline, pteridine, phenanthridine, pteridine, A phenanthro phosphorus, TETORAZA indene, etc. are mentioned and preferably A franc, It is CHIOFEN, pyridine, quinoline, pyrazine, pyrimidine, PIRIDAJIN, triazine, lid RAJIN, NAFUCHI lysine, quinoxaline, and quinazoline, is a franc, CHIOFEN, pyridine, and quinoline more preferably, and is quinoline especially preferably.

[0050]The aliphatic hydrocarbon machine, aryl group, and hetero ring machine which are denoted by R may have a substituent, and can apply the thing quoted as a substituent of a hetero ring machine denoted by A in general formula (I) as a substituent, and their desirable substituent is also the same. Preferably as R, it is an alkyl group, an aryl group, and an aromatic series hetero ring machine, and is an aryl group and an aromatic series hetero ring machine more preferably, and they are an aryl group and an aromatic series AZORU machine still more preferably.

[0051]It is O, S, and N-R preferably as X, and they are O and N-R more preferably, furthermore -- it is N-R preferably -- especially -- desirable -- N-Ar (Ar -- an aryl group.) Are an aromatic series AZORU machine and more preferably The aryl group of the carbon numbers 6-30, the aromatic series AZORU machine of the carbon numbers 2-30 -- further -- desirable -- the aryl group of the carbon numbers 6-20, and the aromatic series AZORU machine of the carbon numbers 2-16 -- they are an aryl group of the carbon numbers 6-12, and an aromatic series AZORU machine of the carbon numbers 2-10 especially preferably. it is .

[0052] Q_3 expresses an atomic group required to form an aromatic series ring. It is an aromatic series hetero ring of 5 or 6 members preferably as an aromatic series ring formed by Q_3 , is a nitrogen-containing aromatic series hetero ring of 5 or 6 members more preferably, and is a

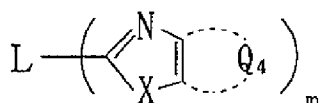
nitrogen-containing aromatic series hetero ring of 6 members still more preferably. [as an example of the aromatic series ring formed by Q_3] For example, benzene, a franc, CHIOFEN, Piran, pyrrole, imidazole, PIRAZORU, pyridine, pyrazine, pyrimidine, PIRIDAJIN, thia ZORU, OKISAZORU, isothiazole, ISOOKI Southall, thiadiazole, oxadiazole and doria -- ZORU, selenazole, tetrazole, etc. are mentioned, and it is pyridine, pyrazine, pyrimidine, and PIRIDAJIN preferably, is pyridine and pyrazine more preferably, and is pyridine still more preferably. The aromatic series ring formed by Q_3 may form the ring and condensed ring of further others, and may have a substituent. The thing quoted as a substituent of a hetero ring machine denoted by A in general formula (I) as a substituent can be applied, and a desirable substituent is also the same.

[0053] It is a compound denoted by following general formula (IV) still more preferably among the compounds denoted by general formula (III).

[0054]

[Chemical formula 20]

一般式 (IV)



[0055] The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively among a formula. The desirable range of X synonymous with it in general formula (III) and is also the same. Q₄ expresses an atomic group required to form a nitrogen-containing aromatic series hetero ring. It is a nitrogen-containing aromatic series hetero ring of 5 or 6 members preferably as a nitrogen-containing aromatic series hetero ring formed by Q₄, and is a nitrogen-containing aromatic series hetero ring of 6 members more preferably. [as an example of the nitrogen-containing aromatic series hetero ring formed by

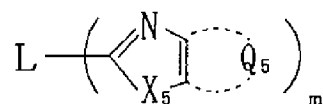
Q_4] For example, pyrrole, imidazole, PIRAZORU, pyridine, pyrazine, Pyrimidine, PIRIDAJIN, thia ZORU, OKISAZORU, isothiazole, ISOOKI Southall, thiadiazole, oxadiazole, and doria -- ZORU, selenazole, tetrazole, etc. are mentioned, and it is pyridine, pyrazine, pyrimidine, and PIRIDAJIN preferably, is pyridine and pyrazine more preferably, and is pyridine still more preferably. The aromatic series hetero ring formed by Q_4 may form the ring and condensed ring of further others, and may have a substituent. The thing quoted as a substituent of a hetero ring machine denoted by A in general formula (I) as a substituent can be applied, and a desirable substituent is also the same.

[0056] It is a compound denoted by following general formula (V) still more preferably among the compounds denoted by general formula (III).

[0057]

[Chemical formula 21]

一般式 (V)



[0058] The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively among a formula. X_5 expresses O, S, or N-R. The desirable range of R synonymous with it in general formula (III) and is also the same. Q_5 expresses an atomic group required to form the nitrogen-containing aromatic series hetero ring of 6 members. [as an example of the nitrogen-containing aromatic series hetero ring of 6 members formed by Q_5] For example, pyridine, pyrazine, pyrimidine, PIRIDAJIN, triazine, etc. are mentioned, and it is pyridine, pyrazine, pyrimidine, and PIRIDAJIN preferably, is pyridine and pyrazine more

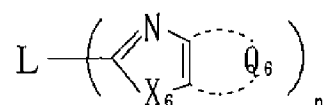
preferably, and is pyridine still more preferably. The nitrogen-containing aromatic series hetero ring of 6 members formed by Q_5 may form the ring and condensed ring of further others, and may have a substituent. The thing quoted as a substituent of a hetero ring machine denoted by A in general formula (I) as a substituent can be applied, and a desirable substituent is also the same.

[0059] It is a compound denoted by following general formula (VI) still more preferably among the compounds denoted by general formula (III).

[0060]

[Chemical formula 22]

一般式 (VI)

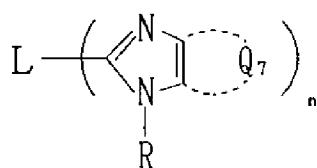


[0061] The desirable range of L synonymous with it in general formula (I) and is also the same among a formula. The desirable range synonymous with X_5 in general formula (V) and of X_6 is also the same. The desirable range synonymous with Q_5 in general formula (V) and of Q_6 is also the same. n expresses the integer of 2 thru/or 8 -- desirable -- 2 thru/or 6 -- it is 2 thru/or 4 more preferably, is 2 or 3 still more preferably, and is 3 especially preferably. It is a compound denoted by following general formula (VII) still more preferably among the compounds denoted by general formula (III).

[0062]

[Chemical formula 23]

一般式 (VII)



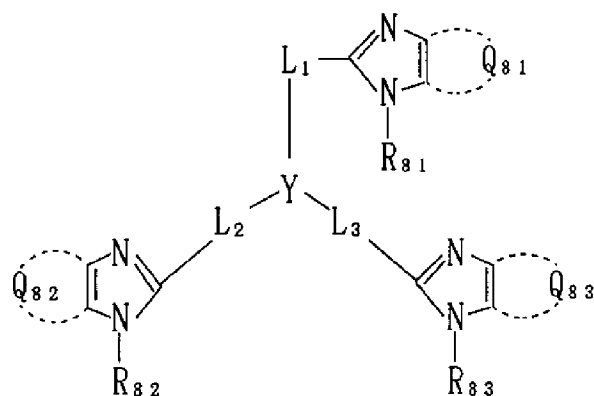
[0063]The desirable range of L synonymous with it in general formula (I) and is also the same among a formula. The desirable range of R synonymous with it in general formula (III) and is also the same. The desirable range synonymous with Q₅ in general formula (V) and of Q₇ is also the same. The desirable range of n synonymous with it in general formula (VI) and is also the same.

[0064]It is a compound denoted by following general formula (VIII) still more preferably among the compounds denoted by general formula (III).

[0065]

[Chemical formula 24]

一般式 (VIII)



[0066]The desirable range synonymous with R in general formula (III) and of R₈₁, R₈₂, and R₈₃ is also the same respectively among a formula. The desirable range synonymous with Q₅ in general formula (V) and of Q₈₁, Q₈₂, and Q₈₃ is also the same respectively. L₁, L₂, and L₃ are synonymous with L in general formula (I) respectively. As L₁, L₂, and L₃, preferably, It is a connection machine which comprises the aromatic series hetero rings and such combination of a single bond, Ally Wren, and 2 values, More preferably A single bond, benzene, NAFUTAREN, anthracene, pyridine, Pyrazine, CHIOFEN, a franc, OKISAZORU, thia ZORU, oxadiazole, thiadiazole and doria -- it being a connection machine which comprises ZORU and such combination, and, It is a connection machine which comprises a single bond, benzene, CHIOFEN, and such combination preferably, is a connection machine which comprises a single bond, benzene, and such combination preferably especially, and is a single bond most preferably. L₁, L₂, and L₃ may have a substituent, and can apply the thing quoted as a substituent of a hetero ring machine denoted by A in general formula (I) as a substituent.

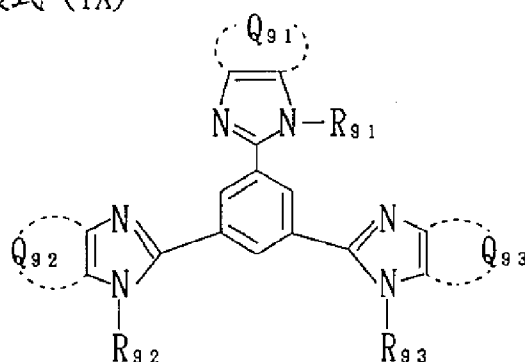
[0067]Y expresses a nitrogen atom or an aromatic series ring. As an aromatic series ring, it is an aromatic series ring of 5 or 6 members, and they are a benzene ring and an aromatic seriesazole ring of 6 members more preferably. As an example of an aromatic series ring, for example A franc, CHIOFEN, pyrrole, Benzene, NAFUTAREN, anthracene, pyrene, phenanthrene, triphenylene, Pyridine, pyrimidine, PIRIDAJIN, pyrazine, triazine, etc. are mentioned, Are benzene, pyridine, pyrimidine, and triazine preferably and more preferably 1, 3, 5-benzene Trier machine, It is a 2,4,6-pyridine Trier machine, 1 and 3, 5-pyrimidine Trier

machine, 2 and 4, and 6-triazine Trier machine, and is 1, 3, and 5-benzene Trier machine especially preferably. Y may have a substituent, when possible, and as a substituent, an alkyl group, an aryl group, a halogen atom, etc. are mentioned. It is a nitrogen atom or no replacing 1 and 3, and 5-benzene Trier machine preferably as Y, and they are no replacing 1 and 3 and 5-benzene Trier machine more preferably. It is a compound especially denoted by following general formula (IX) preferably among the compounds denoted by general formula (III).

[0068]

[Chemical formula 25]

一般式 (IX)

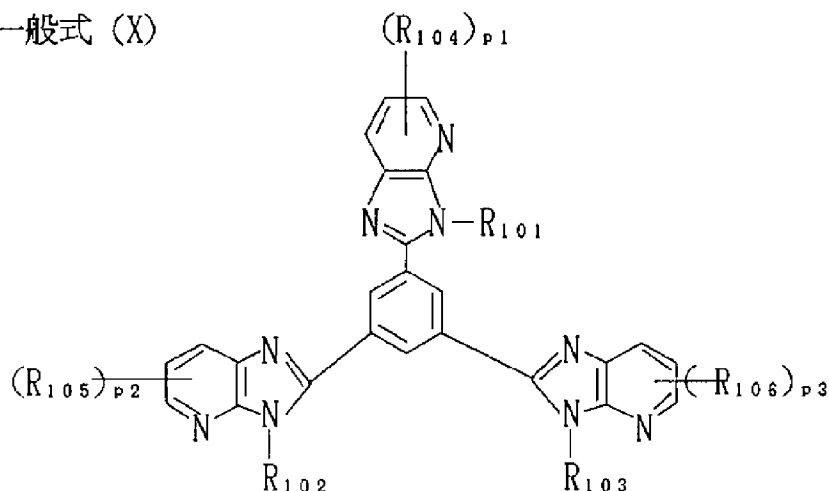


[0069]The desirable range synonymous with R in general formula (III) and of R_{91} , R_{92} , and R_{93} is also the same respectively among a formula. The desirable range synonymous with Q_5 in general formula (V) and of Q_{91} , Q_{92} , and Q_{93} is also the same respectively. It is a compound most preferably denoted by following general formula (X) among the compounds denoted by general formula (III).

[0070]

[Chemical formula 26]

一般式 (X)



[0071]The desirable range synonymous with R in general formula (III) and of R_{101} , R_{102} , and R_{103} is also the same respectively among a formula. R_{104} , R_{105} , and R_{106} can apply the thing quoted as a substituent of a hetero ring machine which expresses a substituent, respectively and is denoted by A in general formula (I) as a substituent, and their desirable substituent is also the same. When possible, substituents may connect and a ring may be formed. p_1 , p_2 , and p_3 express the integer of 0 thru/or 3, respectively -- desirable -- 0 thru/or 2 -- more -- desirable -- 0 or 1 -- it is 0 still more preferably.

[0072]Next, general formula (XI) is explained. The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively. The desirable range synonymous with Q_3 in general formula (III) and of Q_{11} is also the same. R_{11} expresses a hydrogen atom or a substituent. The thing quoted as a substituent of a hetero ring machine denoted by A for example, in general formula (I) as a substituent denoted by R_{11} is applicable. As a substituent denoted by R_{11} , preferably, Are an aliphatic hydrocarbon machine, an aryl group, and an aromatic series hetero ring machine, and more preferably, an alkyl group (desirable -- the carbon numbers 1-20 -- more -- desirable -- the carbon numbers 1-12 -- it being the carbon numbers 1-8 preferably, and especially) For example, methyl, ethyl, isopropyl, tert-butyl, n-octyl, n-DESHIRU, n-hexadecyl, cyclo propyl, cyclopentyl, cyclohexyl etc.

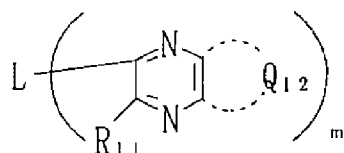
are mentioned -- an aryl group (desirable -- the carbon numbers 6-30 -- more -- desirable -- the carbon numbers 6-20 -- it being the carbon numbers 6-12 preferably, and especially) For example, a phenyl, 2-methylphenyl, 3-methylphenyl, 4-methylphenyl, 4-methoxyphenyl, 3-trifluoromethylphenyl, pentafluorophenyl, 1-Naff Chill, 2-Naff Chill, etc. are mentioned -- an aromatic series hetero ring machine (desirable -- the carbon numbers 1-20 -- desirable -- the carbon numbers 1-12 -- it being an aromatic series hetero ring machine of the carbon numbers 2-10 still more preferably, and) It is an aromatic series hetero ring machine which contains at least one of a nitrogen atom, an oxygen atom, a sulfur atom, and the selenium atoms more preferably. As an aromatic series hetero ring, for example Pyrrolidine, piperidine, pyrrole, A franc, CHIOFEN, imidazoline, imidazole, benzimidazole. Naphthimidazole, thiazolidine, thiazole, BENZUCHIAZORU, Naphthothiazole, isothiazole, oxazoline, OKISAZORU, Benzoxazole, NAFUTOOKI Southall, ISOOKI Southall, selenazole, BENZU selenazole, naphthoselenazole, pyridine, quinoline, isoquinoline, Indore, India renin, PIRAZORU, pyrazine, pyrimidine, PIRIDAJIN, Triazine, indazole, a pudding, lid RAJIN, NAFUCHI lysine, quinoxaline, Quinazoline, cinnoline, pteridine, phenanthridine, pteridine, A phenanthro phosphorus, TETORAZA indene, carbazole, etc. are mentioned, Preferably A franc, CHIOFEN, pyridine, quinoline, pyrazine, pyrimidine, It is PIRIDAJIN, triazine, lid RAJIN, NAFUCHI lysine, quinoxaline, and quinazoline, is a franc, CHIOFEN, pyridine, and quinoline more preferably, and is quinoline still more preferably. It is and they are an aryl group and an aromatic series hetero ring machine still more preferably. The substituent denoted by R_{11} may be replaced further, and when possible, it may be connected, and it may form a ring.

[0073] It is a compound more preferably denoted by following general formula (XII) among the compounds denoted by general formula (XI).

[0074]

[Chemical formula 27]

一般式 (XII)



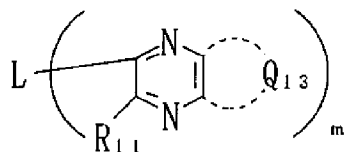
[0075]The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively among a formula. The desirable range synonymous with Q₄ in general formula (IV) and of Q₁₂ is also the same. The desirable range synonymous with it in general formula (XI) and of R₁₁ is also the same.

[0076]It is a compound denoted by following general formula (XIII) still more preferably among the compounds denoted by general formula (XI).

[0077]

[Chemical formula 28]

一般式 (XIII)



[0078]The desirable range synonymous with them in general formula (I) and of m and L is also the same respectively among a formula. The desirable range synonymous with Q₅ in general formula (V) and of Q₁₃ is also the same. The desirable range synonymous with it in general

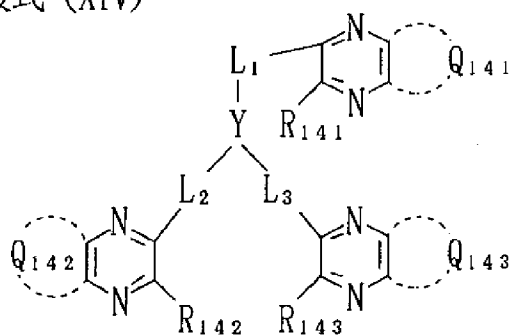
formula (XI) and of R_{11} is also the same.

[0079] It is a compound especially denoted by following general formula (XIV) preferably among the compounds denoted by general formula (XI).

[0080]

[Chemical formula 29]

一般式 (XIV)



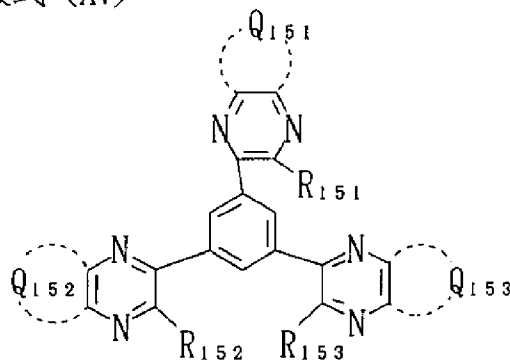
[0081] The desirable range synonymous with them in general formula (VIII) and of L_1 , L_2 , L_3 , and Y is also the same respectively among a formula. The desirable range synonymous with Q_5 in general formula (V) and of Q_{141} , Q_{142} , and Q_{143} is also the same respectively. The desirable range synonymous with R_{11} in general formula (XI) and of R_{141} , R_{142} , and R_{143} is also the same respectively.

[0082] It is a compound most preferably denoted by following general formula (XV) among the compounds denoted by general formula (XI).

[0083]

[Chemical formula 30]

一般式 (XV)



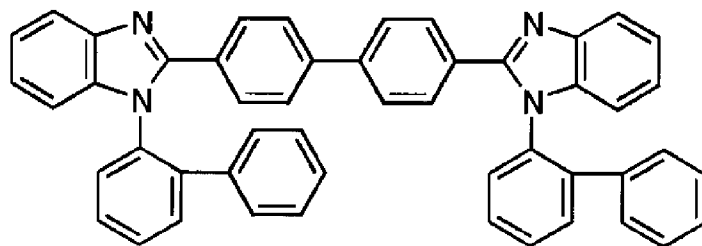
[0084]The desirable range synonymous with Q_5 in general formula (V) and of Q_{151} , Q_{152} , and Q_{153} is also the same respectively among a formula. The desirable range synonymous with R_{11} in general formula (XI) and of R_{151} , R_{152} , and R_{153} is also the same respectively.

[0085]Although the example of a compound (the compound of this invention is called) denoted by general formula (I) of this invention below is shown, this invention is not limited to these.

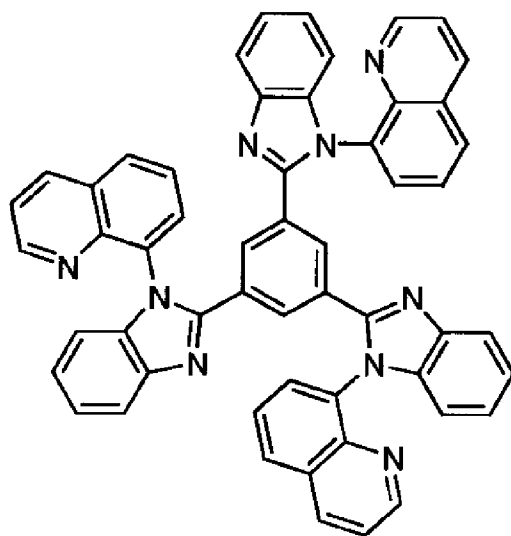
[0086]

[Chemical formula 31]

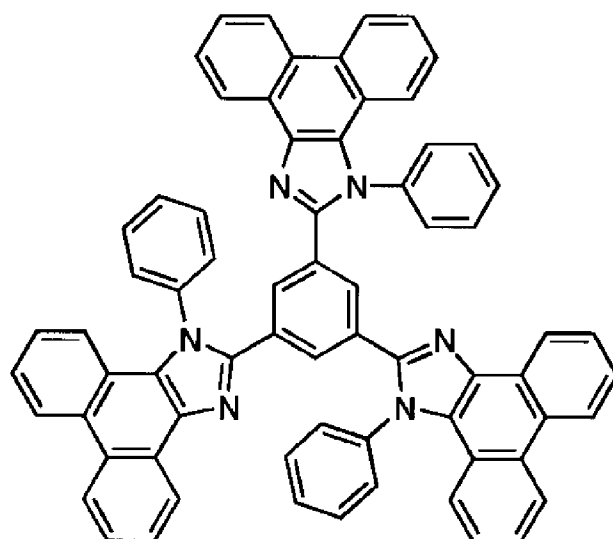
1.



2.



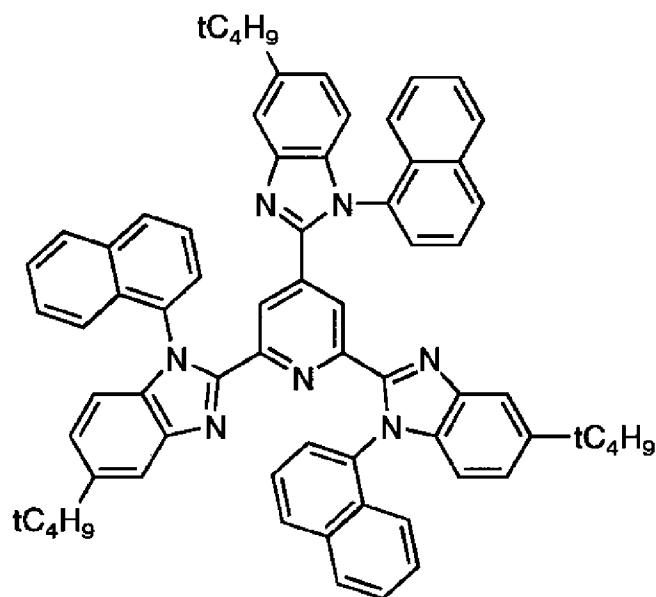
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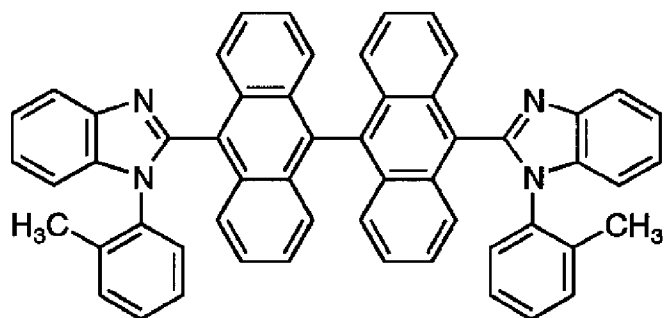
[0087]

[Chemical formula 32]

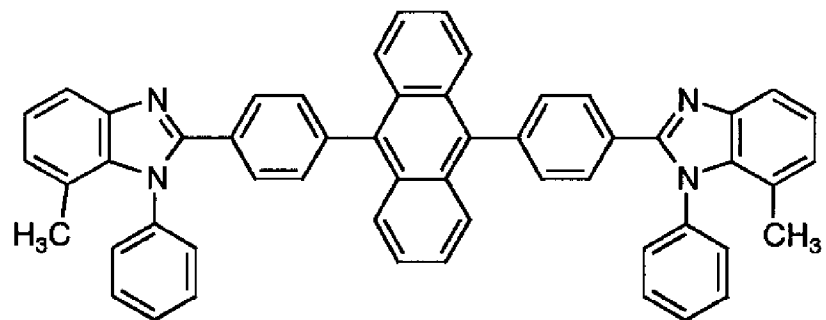
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5.



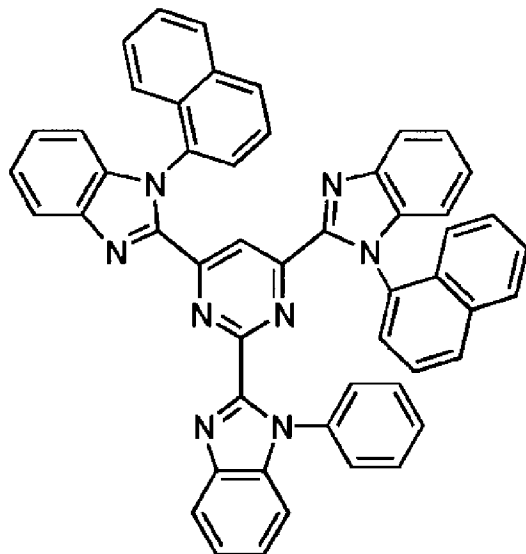
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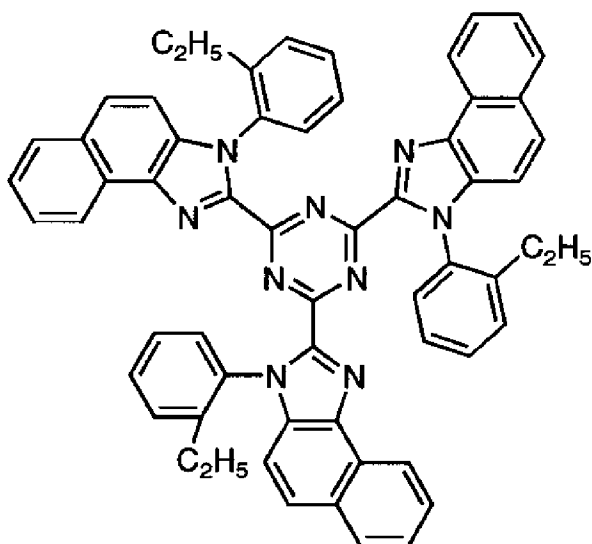
[0088]

[Chemical formula 33]

7.



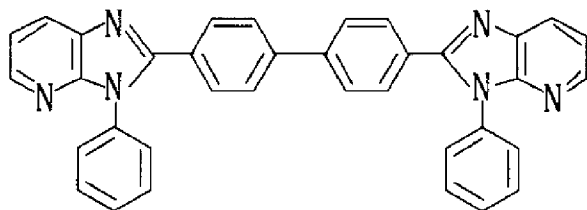
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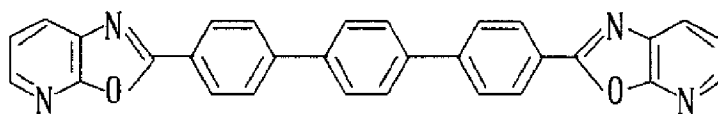
[0089]

[Chemical formula 34]

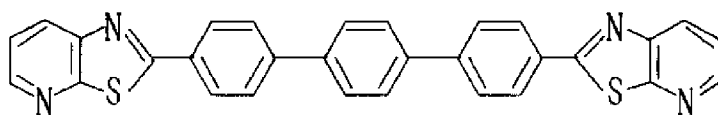
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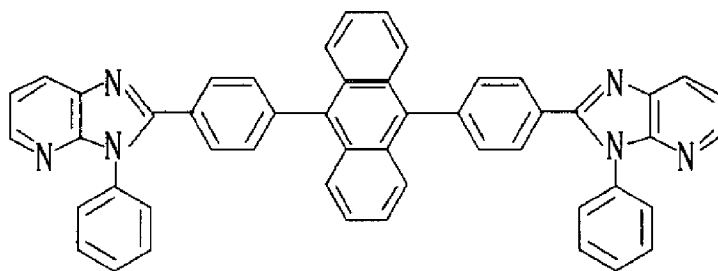
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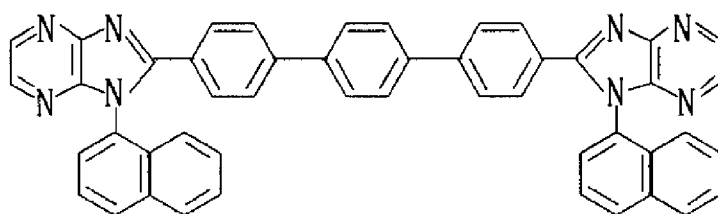
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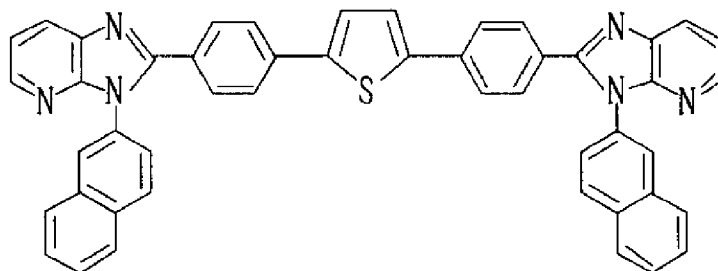
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13.



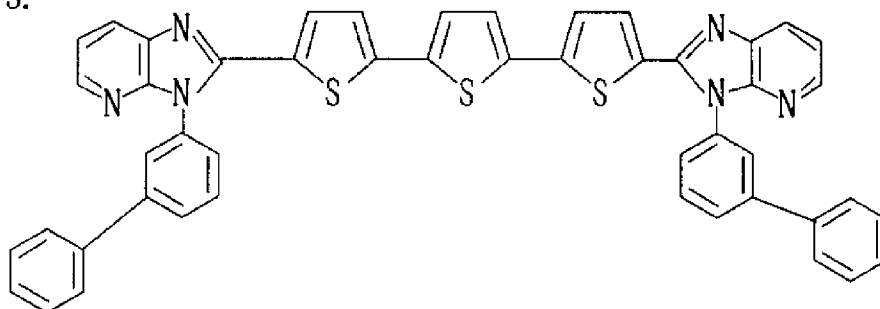
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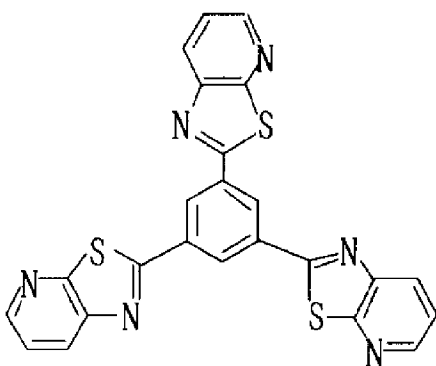
[0090]

[Chemical formula 35]

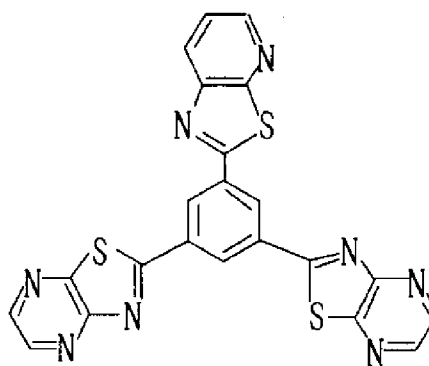
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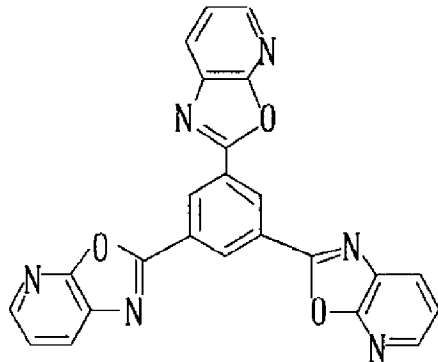
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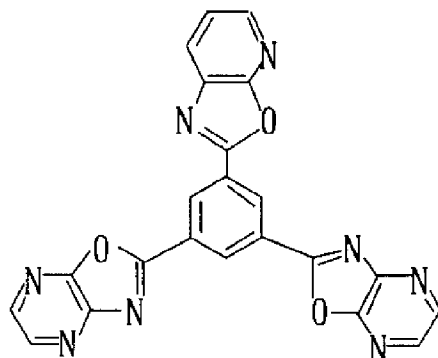
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18.



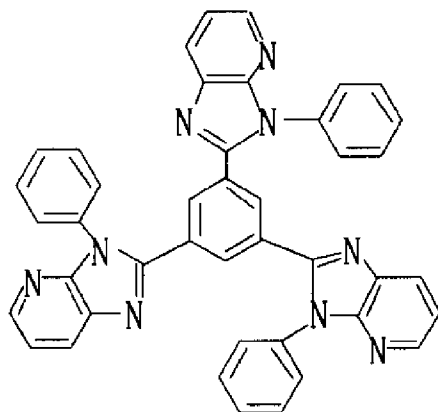
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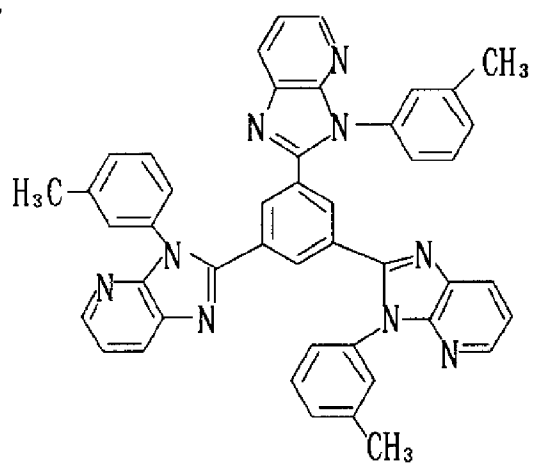
[0091]

[Chemical formula 36]

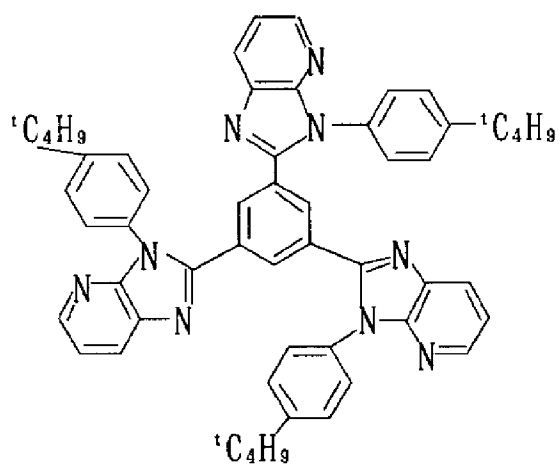
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21.



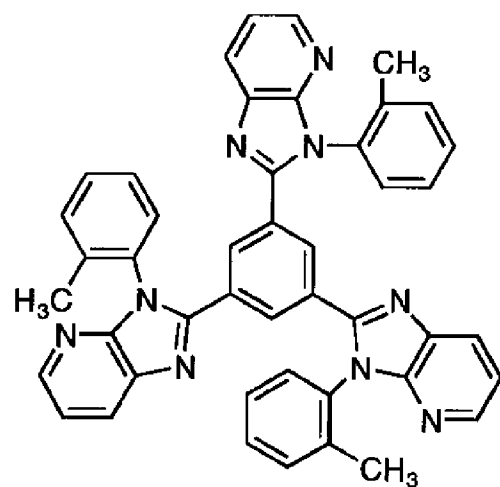
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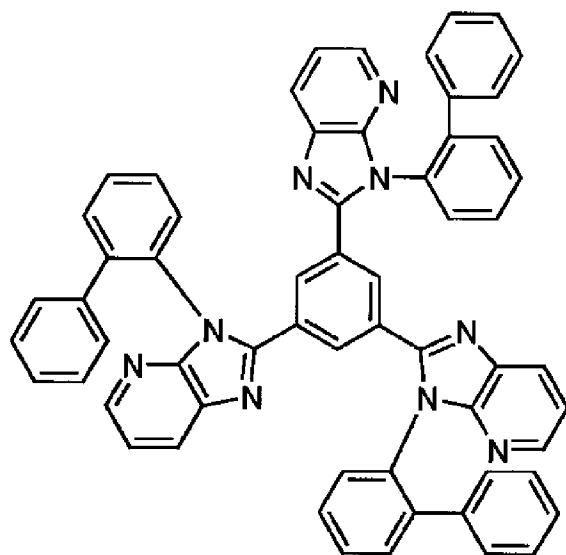
[0092]

[Chemical formula 37]

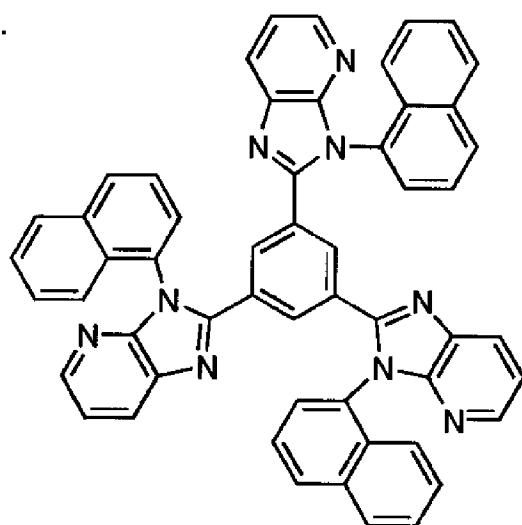
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24.



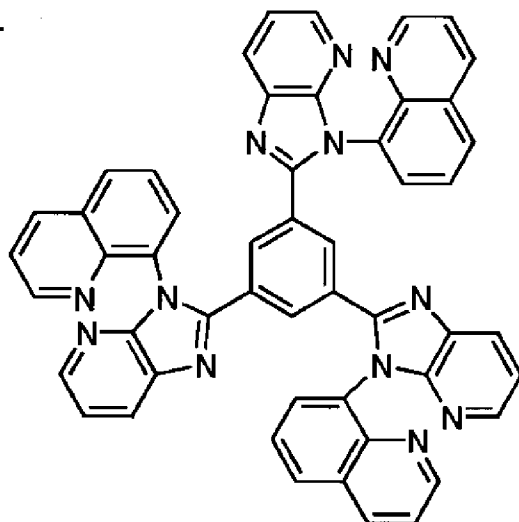
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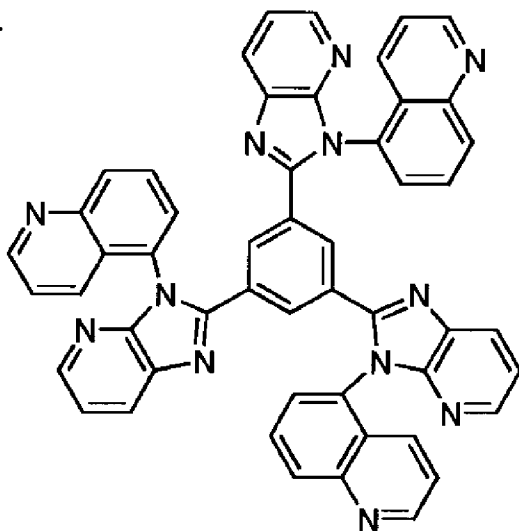
[0093]

[Chemical formula 38]

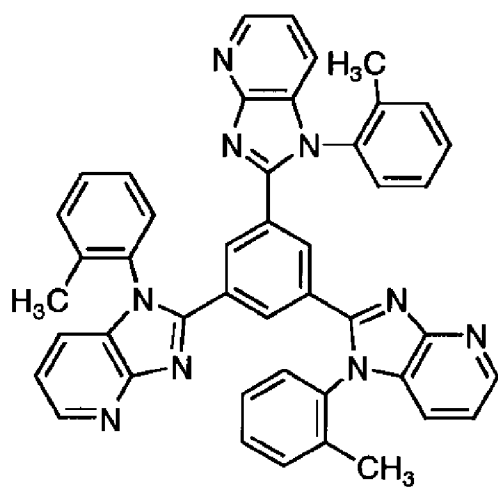
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27.



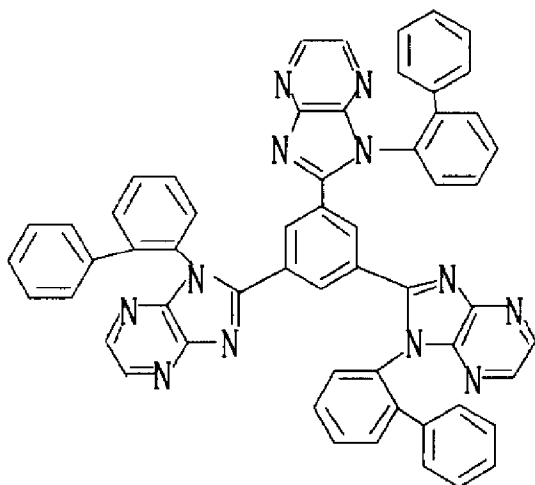
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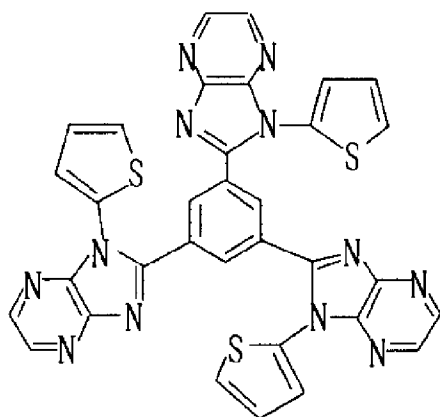
[0094]

[Chemical formula 39]

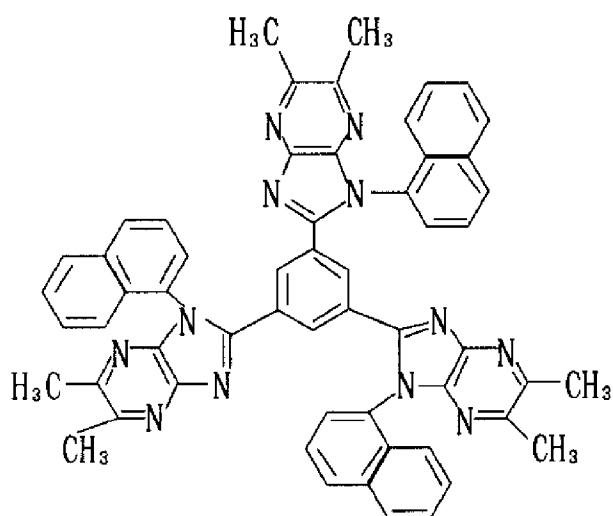
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30.



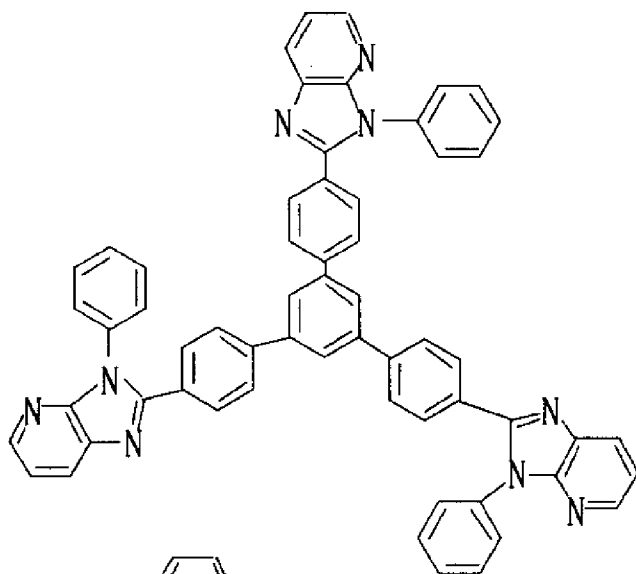
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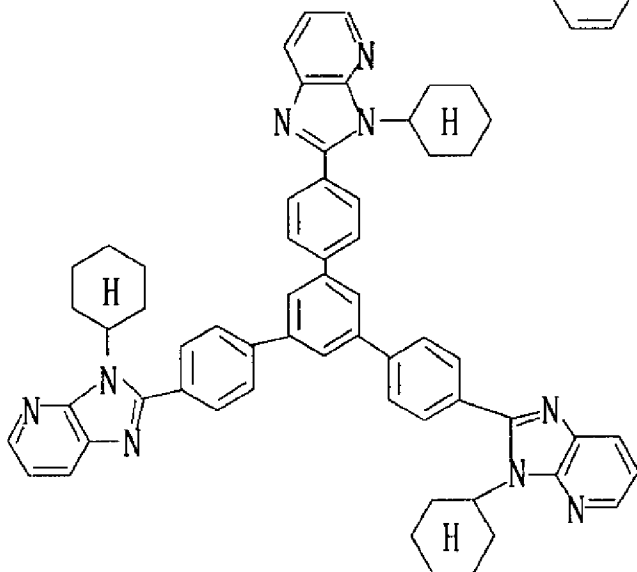
[0095]

[Chemical formula 40]

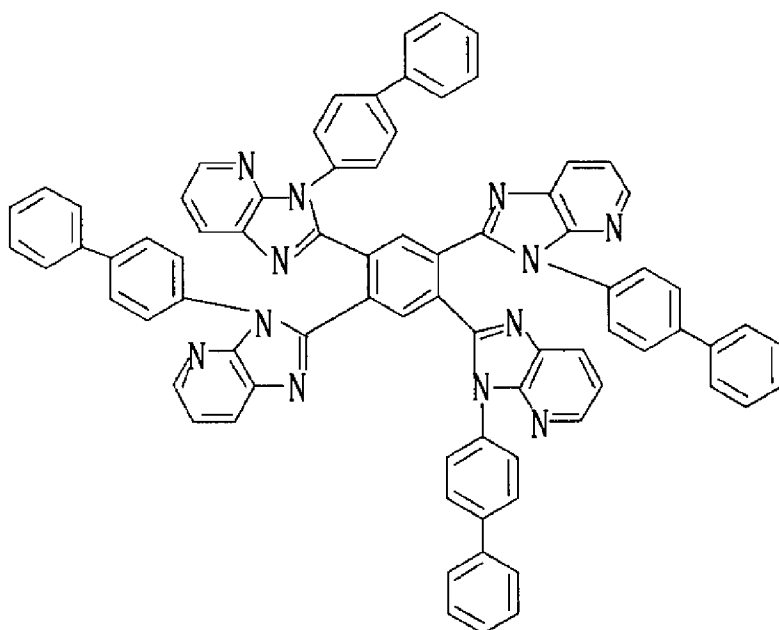
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33.



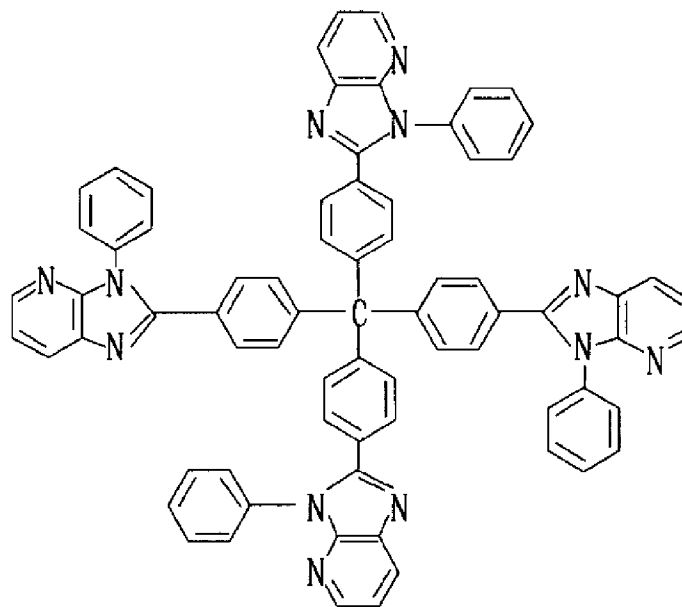
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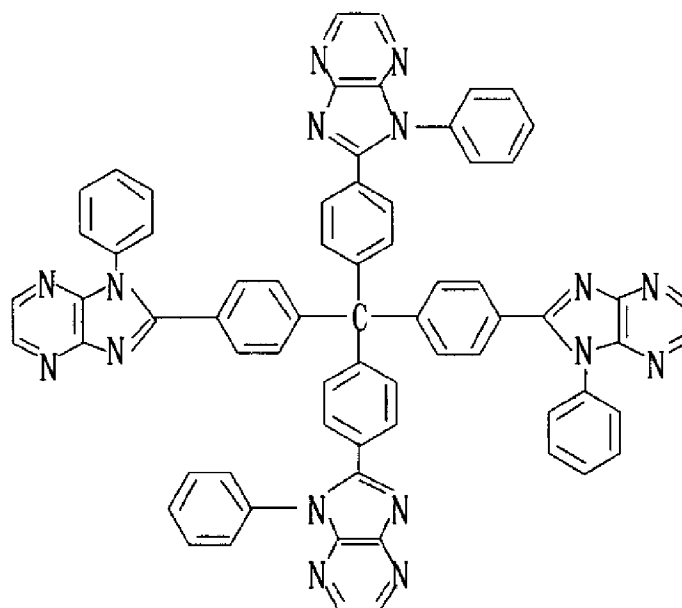
[0096]

[Chemical formula 41]

35.



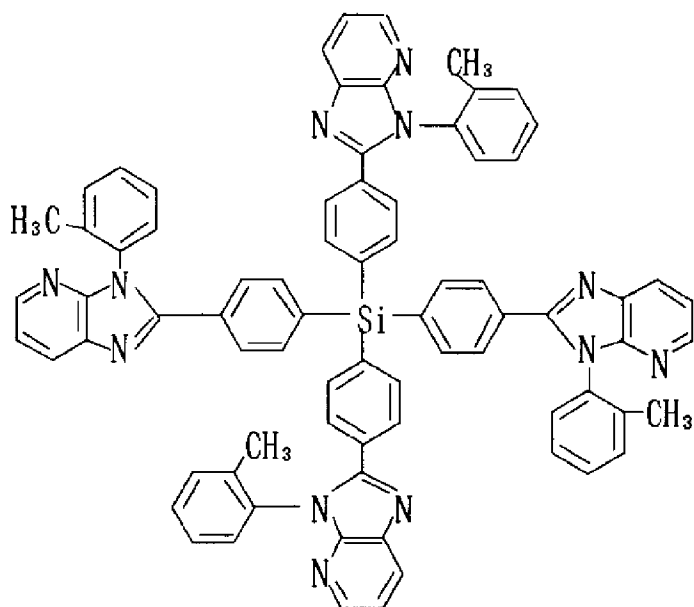
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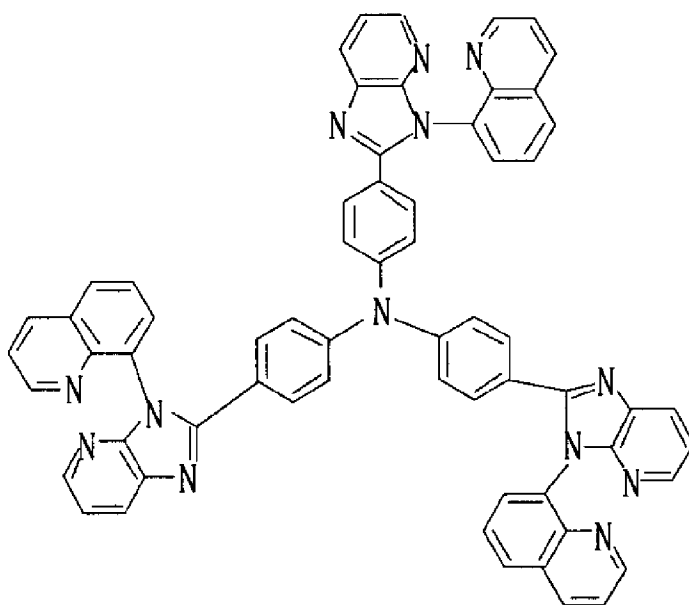
[0097]

[Chemical formula 42]

37.



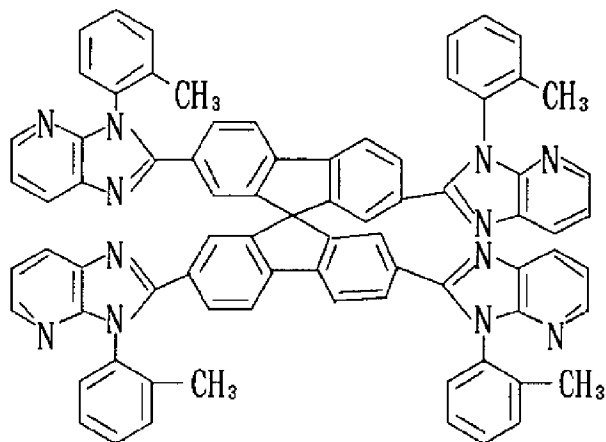
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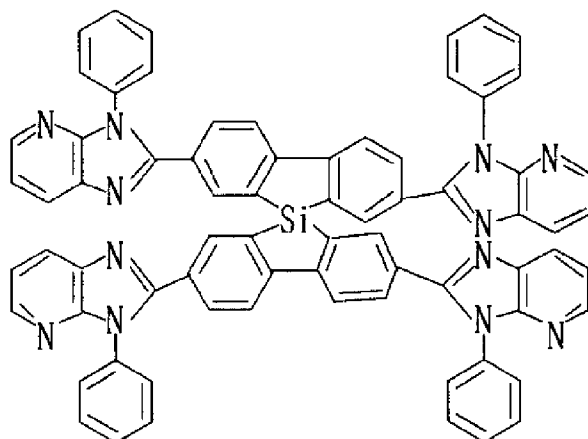
[0098]

[Chemical formula 43]

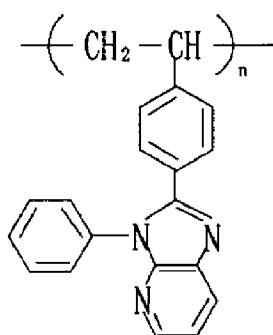
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40.



41.



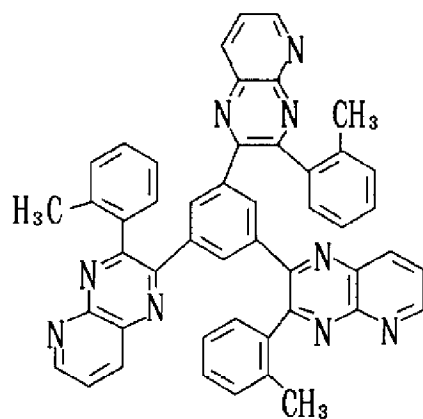
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(ポリスチレン換算)

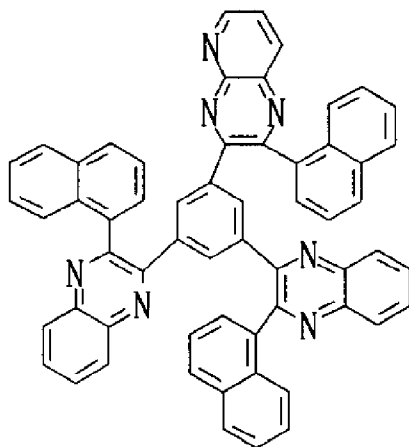
[0099]

[Chemical formula 44]

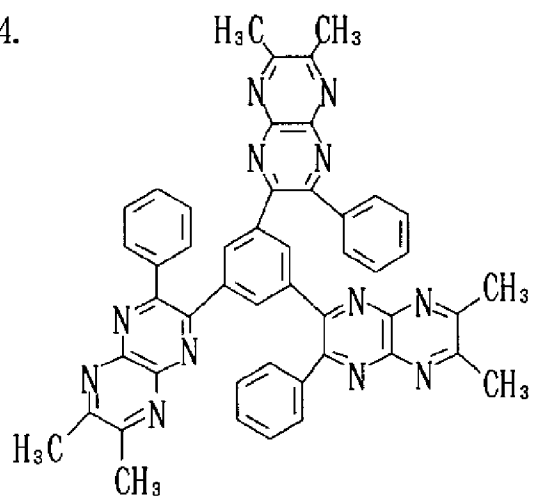
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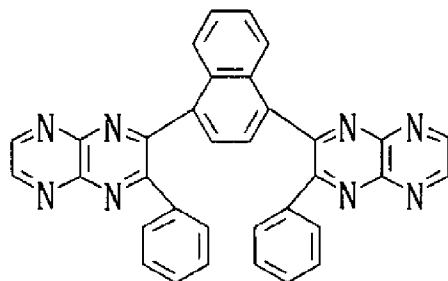
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44.



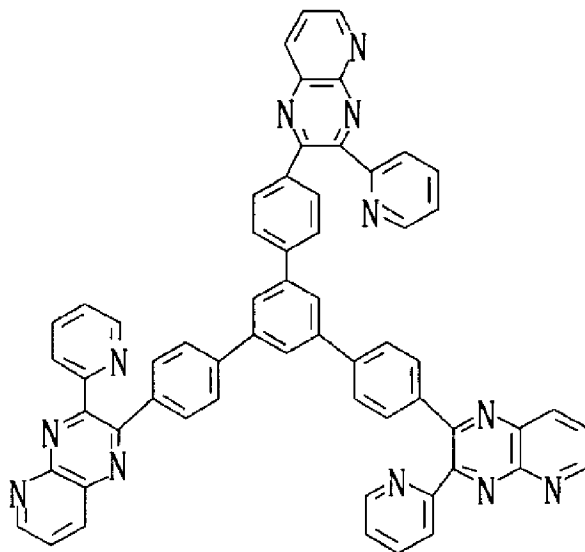
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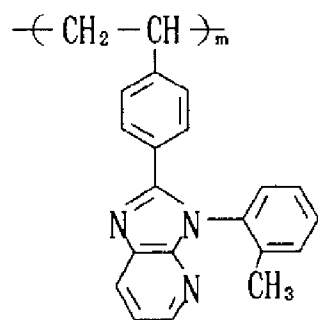
[0100]

[Chemical formula 45]

46.

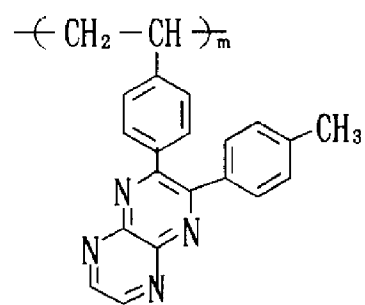


47.



質量平均分子量 21,000 (ポリスチレン換算)

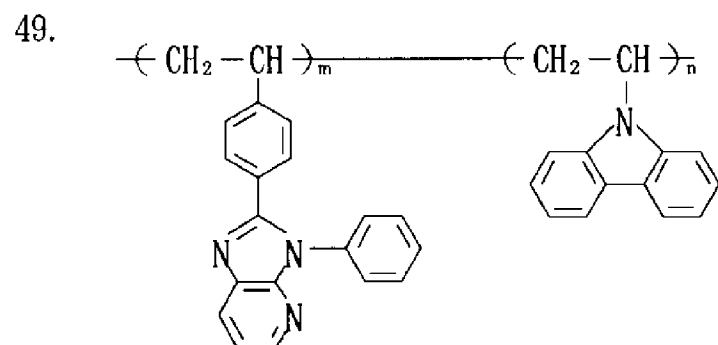
48.



質量平均分子量 14,000 (ポリスチレン換算)

[0101]

[Chemical formula 46]



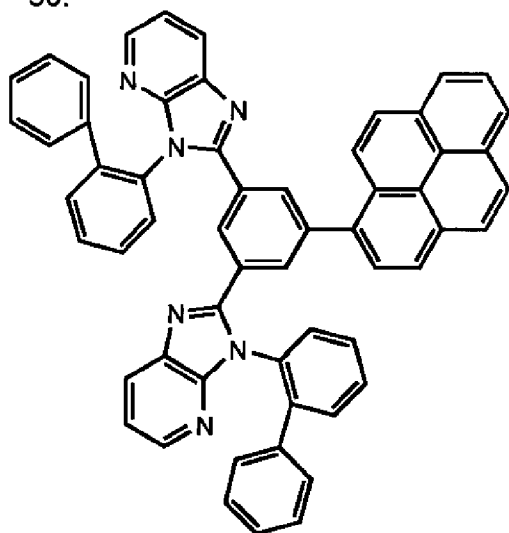
質量平均分子量 17,000 (ポリスチレン換算)

m : n = 1 : 1 (モル比)

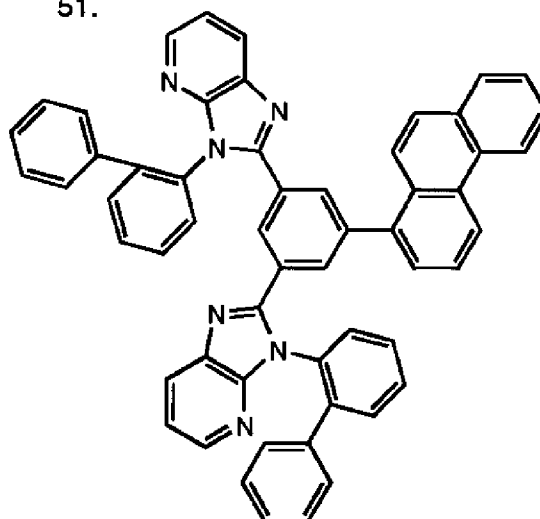
[0102]

[Chemical formula 47]

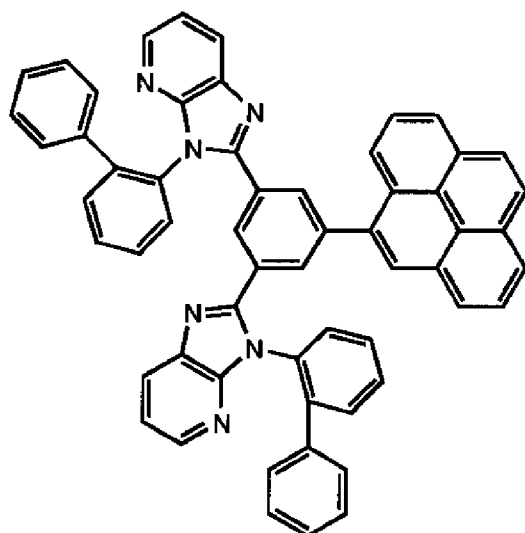
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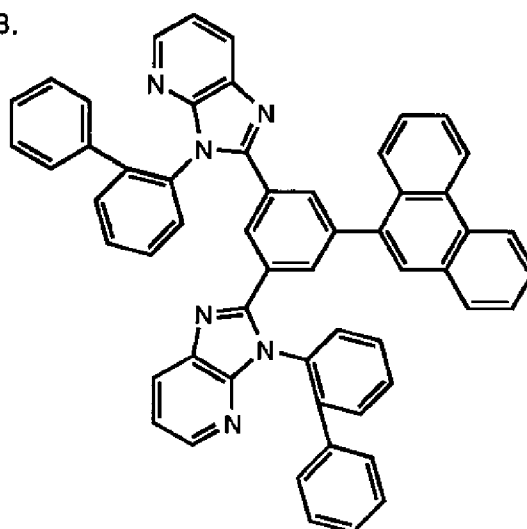
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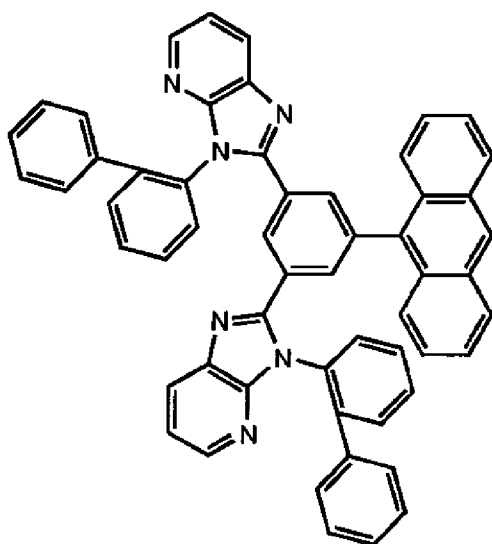
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53.



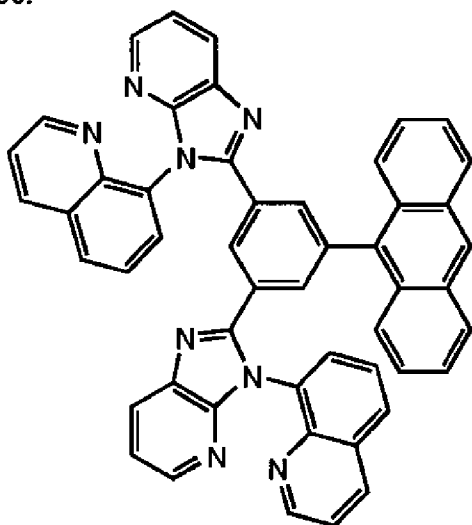
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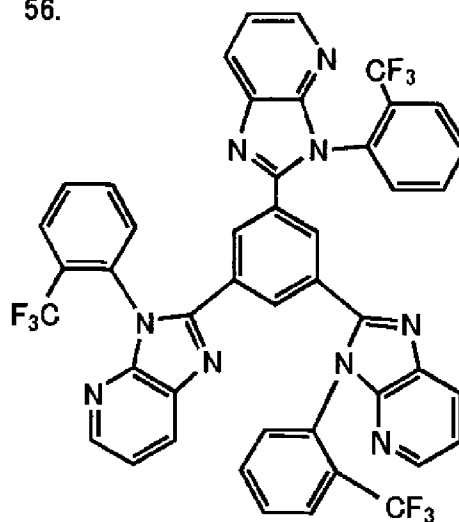
[0103]

[Chemical formula 48]

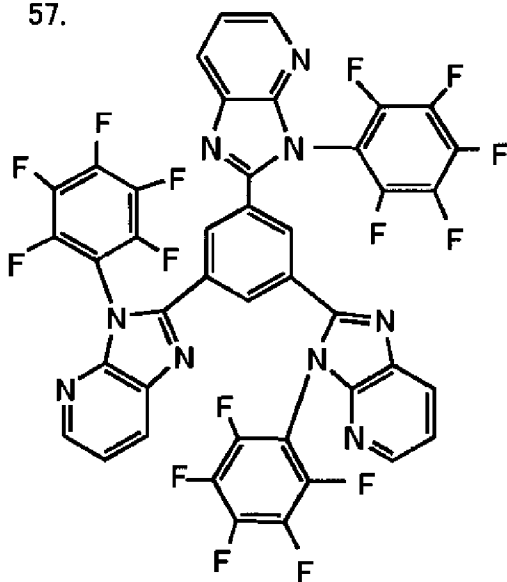
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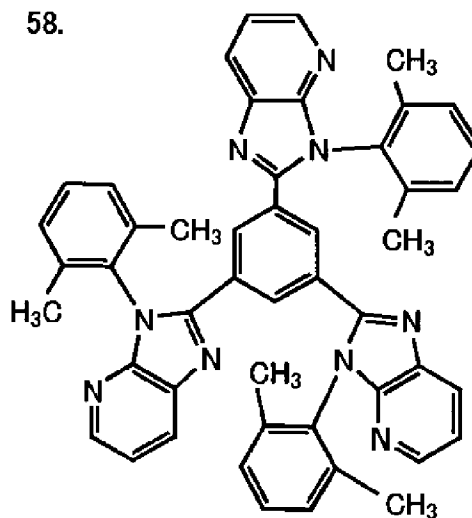
56.



57.



58.



[0104][the compound of this invention denoted by general formula (I) - (XV)] JP,44-23025,B,

48-8842, JP,53-6331,A, JP,H10-92578,A, U.S. Pat. No. 3,449,255 No., said 5,766,779 No., J. A method given in Am.Chem.Soc., 94 and 2414 (1972), Helv.Chim.Acta, 63,413 (1980), Liebigs Ann.Chem., 1423 (1982), Patent Application No. 2000-218967, etc. is referred to, and can be compounded.

[0105]Next, the light emitting element containing the compound of this invention is explained. [the formation method of the organic layer of the light emitting element containing the compound of this invention] Although not limited in particular, methods, such as resistance heating vapor deposition, an electron beam, sputtering, the molecule laminating method, a coating method, the ink-jet method, a replica method, an electro photography method, and the printing method, are used, and resistance heating vapor deposition and a coating method are preferred in respect of the characteristic and manufacture.

[0106]When the compound (compound denoted by general formula (I)) of this invention is used as a charge of light emitting element material, Although it may use for any of hole pouring / transportation layer, electronic pouring / transportation layer, and a luminous layer, it is preferred to use as electronic pouring / transportation layer and/or a luminous layer, it is preferred to use as an electronic pouring / transportation layer more preferably, and acting as an electronic transportation material is still more preferred.

[0107]The light emitting element of this invention is a light emitting element which has two or more organic compound layers which contain a luminous layer and an electron transport layer in inter-electrode [a pair of], and contained two or more sorts of electronic transportation materials, and it is preferred that it is a compound by which at least one sort of said electronic transportation material is expressed with general formula (I).

[0108]The light emitting element of this invention is an element in which two or more organic compound films which contain a luminous layer and an electron transport layer in inter-electrode [of an anode and the negative pole / a pair of] were formed, may have a luminous layer, a hole injection layer besides an electron transport layer, an electron hole transportation layer, a protection layer, etc., and may be provided with the function of others [each layers / these], respectively. Various materials can be used for formation of each layer, respectively.

[0109]The anode can supply an electron hole to a hole injection layer, an electron hole transportation layer, a luminous layer, etc., metal, an alloy, a metal oxide, electrical conductivity compounds, or these mixtures can be used, and a work function is not less than 4-eV material preferably. As an example, conductive metallic oxide, such as tin oxide, a zinc oxide, indium oxide, and indium tin oxide (ITO), Or the mixture or lamination thing of metal, such as gold, silver, chromium, and nickel, and also such metal, and conductive metallic oxide, Organic conductive materials, such as inorganic conductivity substances, such as copper iodide and copper sulfide, poly aniline, poly CHIOFEN, and polypyrrole, the lamination thing of these and ITO, etc. are mentioned, preferably, it is conductive metallic oxide and ITO is preferred from points, such as productivity, high conductivity, and transparency, especially. Although the film thickness of an anode is selectable suitably by material, the thing of the range of 10 nm - 5 micrometers is preferred, are 50 nm - 1 micrometer more preferably, and are usually 100 nm - 500 nm still more preferably.

[0110]That the anode usually carried out [that] layer formation on soda lime glass, nonalkali glass, a transparent resin board, etc. is used. When using glass, in order to lessen the elution ion from glass, about the quality of the material, it is preferred to use nonalkali glass. When using soda lime glass, it is preferred to use what gave barrier coats, such as silica. If the thickness of a substrate is enough to maintain mechanical strength, there will be no restriction in particular, but in using glass, it usually uses a thing of 0.7 mm or more preferably 0.2 mm or more. Although various methods are used for production of an anode by material, when it is ITO, for example, film formation is carried out by methods, such as an application of an electron beam method, the sputtering method, the resistance heating vapor-depositing method, chemical reaction methods (sol-gel method etc.), and the distributed thing of indium tin oxide. By washing and other processings, the anode can drop the drive voltage of an element or can also raise luminous efficiency. For example, in ITO, UV-ozonization, plasma treatment, etc. are effective.

[0111]The negative pole supplies an electron to an electronic injection layer, an electron transport layer, a luminous layer, etc., and is chosen in consideration of adhesion nature with a layer, ionization potential, stability which adjoin the negative poles, such as an electronic injection layer, an electron transport layer, and a luminous layer. As a material of the negative pole, metal, an alloy, a metal oxide, electrical conductivity compounds, or these mixtures can be used, As an example, alkaline metals (for example, Li, Na, K, Cs, etc.) or the fluoride of

those, An oxide, alkaline-earth metals (for example, Mg, Ca, etc.), or the fluoride of those, An oxide, gold, silver, a lead, aluminum, sodium potassium alloys, or those mixed metal, Lithium aluminium alloys or those mixed metal, magnesium silver alloys, or those mixed metal, Rare earth metals, such as indium and ITTERIBIUMU, etc. are mentioned, a work function is material of 4 eV or less preferably, and they are aluminum, lithium aluminium alloys or those mixed metal, magnesium silver alloys, or those mixed metal more preferably. Although the film thickness of the negative pole is selectable suitably by material, the thing of the range of 10 nm - 5 micrometers is preferred, are 50 nm - 1 micrometer more preferably, and are usually 100 nm - 1 micrometer still more preferably. Methods, such as an electron beam method, the sputtering method, the resistance heating vapor-depositing method, and a coating method, are used for production of the negative pole, and vapor-depositing metal alone can also vapor-deposit two or more ingredients simultaneously. The alloy which is possible also for vapor-depositing two or more metal simultaneously, and forming an alloy electrode, and was adjusted beforehand may be made to vapor-deposit. The lower one of the sheet resistance of an anode and the negative pole is preferred, and below hundreds of ohms / ** are preferred.

[0112]The material of a luminous layer can pour in an electron hole from an anode or a hole injection layer, and an electron hole transportation layer at the time of electric field impression, and The negative pole or an electronic injection layer, It is [anything] good if the layer which has a function in which an electron can be poured in from an electron transport layer, and the function, to which the poured-in electric charge is moved and the function to provide an electron hole and the place of an electronic re-combination, and to make them emit light can be formed. What emits light from an excitation singlet state as a compound used for a luminous layer (fluorescence luminescence compound), Any of what emits light from an excitation triplet state (phosphorescence luminescence compound) may be sufficient, For example, BENZOOKI Southall, benzimidazole, benzothia ZORU, Styryl benzene, the poly phenyl, diphenyl butadiene, tetra-phenyl butadiene, NAFUTARU imide, Kumarin, PERIREN, PERINON, oxadiazole, Aldazine, PIRARIJIN, cyclo pen TAJIEN, screw styryl anthracene, Cinchona bark KURIDON, pyrrolo pyridine, thiadiazolo pyridine, cyclo pen TAJIEN, The metal complexes and these derivatives of styryl amine, an aromatic dimethyldiyne compound, and 8-KINORINORU, Transition metal complexes (for example, ORUSO metal-ized complexes, such as tris (2-phenyl pyridine) iridium (III) etc.) Polymer compounds, such as poly CHIOFEN, such as various metal complexes represented by the rare earth complex, poly phenylene, poly phenylenevinylene, and poly full OREN, etc. are mentioned.

[0113] It is preferred to contain a phosphorescence luminescence compound in a luminous layer in this invention in respect of luminous efficiency. Luminescence (for example, the Mie paragraph -> single paragraph) based on changes between the paragraphs from which the degree of multiplex differs defines the phosphorescence luminescence compound in this invention as a thing stronger than other substances. Phosphorus light-quantum **** in normal temperature is not less than 25% of thing preferably, It is not less than 40% of thing more preferably, and is 60% of thing still more preferably, The metal complex which is not less than 80% of thing preferably, for example, has especially an organic compound which does not contain metal, and metal-heteroatom binding, the organic metal complex which has metal-carbon combination, etc. are mentioned, and the alt. metal-ized metal complex of a description, etc. are listed to the following. Next, an organic metal complex is explained. An organic metal complex points out the compound with which metal and an organic group were directly connected by combination of metal-carbon as it defines, for example as 6 pages of "organometal chemistry-foundation and application [-]" p150,232 Shokabo Publishing Co., Ltd. Yamamoto [Akio] work (1982 issue). Next, the alt. metal-ized metal complex used by this invention is explained. With an alt. metal-ized metal complex, for example "Organometal chemistry-foundation and application [-]" p150,232 Shokabo Publishing Co., Ltd. Yamamoto [Akio] work 1982 issue, "Photochemistry and. Photophysics of Coordination Compounds It is a general term of the compound group indicated to issue etc. in p71-p77 and p135-p146 Springer-VerlagH.Yersin work 1987." As a central metal of a metal complex, if it is a transition metal, anything is usable, but by this invention, rhodium, platinum, gold, iridium, RUTENIUMU, palladium, RENIUMU, osmium, etc. can be used preferably especially. The more desirable things in this are platinum, iridium, RUTENIUMU, and RENIUMU, are platinum and iridium still more preferably, and are iridium especially preferably.

[0114] Although the number of ** in particular of the metal of an alt. metal-ized metal complex is not limited, trivalent is preferred when using iridium. A child will not ask it, especially if at least ** of an alt. metal-ized metal complex is a thing which can form an alt. metal-ized metal complex, but. For example, an aryl group substitution nitrogen-containing heterocycle (the substitution position of an aryl group is on the contiguity carbon of a nitrogen-containing heterocycle nitrogen atom, and) [a position] They are mentioned by a phenyl group, a naphthyl group, an anthryl group, pyrenyl machine, etc. as an aryl group, and, [as a nitrogen-containing heterocycle] For example, pyridine, pyrimidine, pyrazine, PIRIDAJIN, quinoline, Iso quinoline, quinoxaline, lid RAJIN, quinazoline, NAFUCHI lysine, Cinnoline, a phenanthro phosphorus, pyrrole, imidazole, PIRAZORU, OKISAZORU, oxadiazole, and doria -- ZORU and thiadiazole. . Benzimidazole, BENZOOKI Southall, benzothia ZORU, phenanthridine, etc. are

mentioned. Heteroaryl-group substitution nitrogen-containing heterocycle (the substitution position of a heteroaryl group is on the contiguity carbon of a nitrogen-containing heterocycle nitrogen atom, and) [a position] As a heteroaryl group, for example, 7,8-benzoquinoline, phosphino ARIRU, phosphino heteroaryl, phosphino KISHIA reel, phosphino KISHIHETEROA reel by which the basis containing the aforementioned nitrogen-containing heterocycle derivative, a thienyl group, a frill machine, etc. are mentioned, These derivatives, such as aminomethyl ARIRU and aminomethyl heteroaryl, are mentioned. An aryl group substitution nitrogen-containing aromatic series hetero ring, a heteroaryl-group substitution nitrogen-containing aromatic series hetero ring, 7,8-benzoquinoline and these derivatives are preferred, phenyl pyridine, thienyl pyridine, 7,8-benzoquinoline, and these derivatives are still more preferred, and thienyl pyridine and its derivative, 7,8-benzoquinoline, and especially its derivative are preferred.

[0115]At least as for ** which needs the compound of this invention to form an alt. metal-ized metal complex, at least other ** may have a child in addition to the child. Although at least various publicly known ** have a child as a child, [other **] For example, "Photochemistry and Photophysics of Coordination Compounds" Springer-VerlagH.Yersin work 1987 issue, At least ** of a description will be mentioned to issue etc. by the child in "organometal chemistry-foundation and application [-]" Shokabo Publishing Co., Ltd. Yamamoto [Akio] work 1982, and it preferably, At least halogen ** are a child (preferably about ***** child), nitrogen-containing heterocycle ligands (for example, BIPIRIJIRU, a phenanthro phosphorus, etc.), and a diketone ligand, and at least ***** is [at least a child and BIPIRIJIRU **] children more preferably.

[0116]There may be one kind of child and at least ** which the alt. metal-ized metal complex used for this invention has may have two or more kinds. The number of children is as preferred as ** in a complex, and it is 1-3 kinds, is 1 or 2 kinds especially preferably, and is one kind still more preferably.

[0117]the carbon number of the alt. metal-ized metal complex used for this invention -- desirable -- 5-100 -- more -- desirable -- 10-80 -- it is 14-50 still more preferably.

[0118][the desirable form of the alt. metal-ized metal complex used for this invention]

JP,2001-181616,A, JP,2001-181617,A, JP,2001-247859,A, Patent Application No. 2000-89274, Patent Application No. 2000-398908, Patent Application No. 2001-45476, Patent Application No. 2001-189539, Patent Application No. 2001-219909, Patent Application No. 2001-239281, A compound Patent Application No. 2001-248165, WO 00/No. 57676, WO 00/No. 70655, WO01 / No. 39234A2, WO01 / No. 41512A1, and given in an United States patent public presentation 6097147A item etc. are mentioned.

[0119]Although the film thickness in particular of a luminous layer is not limited, usually the thing of the range of 1 nm - 5 micrometers is preferred, and are 5 nm - 1 micrometer more preferably, and it is 10 nm - 500 nm still more preferably. Although the formation method in particular of a luminous layer is not limited, resistance heating vapor deposition, Methods, such as an electron beam, sputtering, the molecule laminating method, coating methods (a spin coat method, the cast method, a dip coating method, etc.), the ink-jet method, a replica method, an electro photography method, the printing method, and the LB method, are used, and they are resistance heating vapor deposition and a coating method preferably.

[0120]The material of a hole injection layer and an electron hole transportation layer should just have the function to pour in an electron hole from an anode, the function to convey an electron hole, or function which carries out the barrier of the electron poured in from the negative pole. as the example -- carbazole, and, [doria] Oxadiazole, imidazole, poly ARIRU Alekan, PIRAZORIN, PIRAZORON, Feni range amine, ARIRU amine, amino substitution CULCON, Styryl anthracene, a fluorenone, hydrazone, SUCHIRUBEN, Syros Zhang, An aromatic series tertiary-amine compound, a styryl amine compound, an aromatic series JIMECHIRIDIN system compound, Conductive polymer oligomer, such as the Pori Phi Lynne system compound, a polysilane system compound, poly (N-vinyl carbazole), an aniline system copolymer, CHIOFEN oligomer, and poly CHIOFEN, organic silane compounds and these derivatives, a carbon film, etc. are mentioned. Although the film thickness in particular of a hole injection layer and an electron hole transportation layer is not limited, usually the thing of the range of 1 nm - 5 micrometers is preferred, and are 5 nm - 1 micrometer more preferably, and it is 10 nm - 500 nm still more preferably. A hole injection layer and an electron hole transportation layer may be monolayer structures which consist of one sort of the material mentioned above, or two sorts or more, and may be a multilayer structure which consists of two or more layers of the same composition or different-species composition. As a formation method of a hole injection layer and an electron hole transportation layer, a vacuum evaporation method, the LB method, the methods (a spin coat method, the cast method, a dip

coating method, etc.) of dissolving or distributing a solvent and coating it with said electron hole pouring transportation agent, the ink-jet method, a replica method, an electro photography method, the printing method, etc. are used. In the case of a coating method, can dissolve or distribute with a resinous principle and as a resinous principle for example, Polyvinyl chloride, polycarbonate, polystyrene, poly methyl methacrylate, Poly butyl methacrylate, polyester, polysulfone, polyphenylene oxide, Poly butadiene, poly (N-vinyl carbazole), hydrocarbon resin, Ketone resin, FENOKISHI resin, polyamide, ethyl cellulose, acetic acid vinyl, ABS resin, polyurethane, melamine resin, unsaturated polyester resin, alkyd resin, an epoxy resin, silicon resin, etc. are mentioned.

[0121]The material of the electronic injection layer and the electron transport layer should just be carrying out the owner of the function to pour in an electron from the negative pole, the function to convey an electron, and the function that carries out the barrier of the electron hole poured in from the anode either. Although the compound of this invention is preferably contained in an electronic injection layer and/or an electron transport layer, other materials of the compound of this invention can also be used. as the example -- doria -- ZORU, OKISAZORU, and oxadiazole. A fluorenone, anthra KINOJI methane, Antron, diphenyl quinone, Thiopyran dioxide, a carbodiimide, full ORENIRIDEN methane, Heterocyclic tetracarboxylic acid anhydrides, such as JISUCHIRIRU pyrazine and NAFTA REMPERIREN, The various metal complexes represented by phthalocyanine, an organic silane compound, the metal complex of 8-KINORINORU and metal phthalocyanine, and the metal complex in which at least ** makes BENZOOKI Southall and benzothia ZORU a child, these derivatives, etc. are mentioned. Although the film thickness in particular of an electronic injection layer and an electron transport layer is not limited, usually the thing of the range of 1 nm - 5 micrometers is preferred, and are 5 nm - 1 micrometer more preferably, and it is 10 nm - 500 nm still more preferably. An electronic injection layer and an electron transport layer may be monolayer structures which consist of one sort of the material mentioned above, or two sorts or more, and may be a multilayer structure which consists of two or more layers of the same composition or different-species composition.

[0122]The effect (especially the improvement in luminous efficiency, a drive voltage fall, the improvement in endurance) of this invention is revealed by being a compound which contains two or more sorts of electronic transportation materials in an electron transport layer and by which at least one sort of them is expressed with general formula (I) - (XV) of this invention. In order to reveal the effect of this invention more effectively, it is preferred to make an electron

transport layer into the lamination structure more than two-layer. It is also preferred to contain at least one sort of a compound denoted by general formula (I) - (XV) of this invention and other electronic transportation materials in the same layer. It is preferred for an electron transport layer to consist of more than two-layer, and to contain at least one sort of a compound which is general formula (I) - (XV) and is expressed to at least one layer of an electron transport layer, and to contain other electronic transportation materials in other electron transport layers. It is preferred to contain at least two sorts of a compound denoted by an electron transport layer by general formula (I) - (XV). In order to be a large area and to produce the element of efficient and high durability according to a simple manufacturing process, It is preferred that it is the layer which distributed to polymer at least one sort of the compound which contains two or more sorts of electronic transportation materials and, by which at least one layer of an electron transport layer is expressed with general formula (I) - (XV) (it contains also when the uniform dissolution is carried out). In order to realize blue luminescence good [the conventionally difficult color purity] and efficient, it is preferred to provide the layer which contains two or more sorts of electronic transportation materials, and contains at least one sort of compounds between a blue luminous layer and the negative pole further denoted by general formula (I) - (XV) at least. In the point of a drive voltage fall and the improvement in luminous efficiency, it has a layer more than two-layer between a luminous layer and the negative pole, [between the layer and the negative pole containing the compound which contains at least one sort of compounds expressed with said general formula (I) - (XV) to the layer which touches a luminous layer, and is denoted by general formula (I) - (XV)] It is more preferred than the compound denoted by general formula (I) - (XV) to provide the layer containing the large compound of electron affinity.

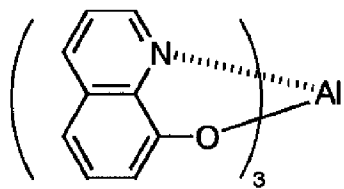
[0123]It is the compound and metal complex type electronic transportation material denoted by general formula (I) from which structure differs - (XV) preferably as an electronic transportation material which is used together with the compound denoted by general formula (I) - (XV) of this invention, and is used. It is the combination of a compound denoted by general formula (I) - (XV) more preferably [both], or is the combination of a compound and metal complex type electronic transportation material denoted by general formula (I) - (XV). When laminating an electron transport layer more than two-layer, it is using a compound with larger electron affinity than the compound denoted by general formula (I) - (XV) between the layer and negative pole using the compound expressed with general formula (I) - (XV) to the layer which touches a luminous layer preferably. It is metal complex type electronic transportation material preferably as a compound with larger electron affinity than the compound which are general formula (I) - (XV) and is expressed.

[0124]It is a metal complex in which at least ** which has a hydroxy group and an AZORU part has a child in a molecule preferably as the above-mentioned metal complex type electronic transportation material, and is aluminum, Zn, Ga, B, and Be complex more preferably, and they are aluminum, Zn, and Ga complex still more preferably. The following are mentioned as such a metal complex.

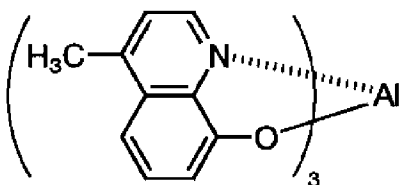
[0125]

[Chemical formula 49]

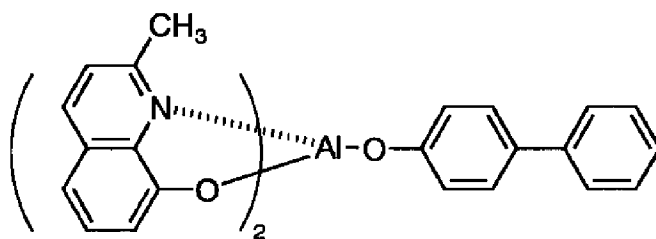
K1



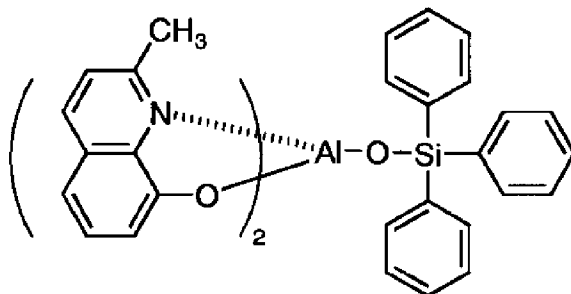
K2



K3



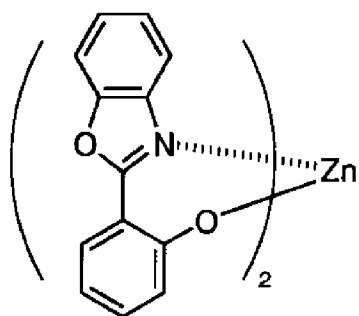
K4



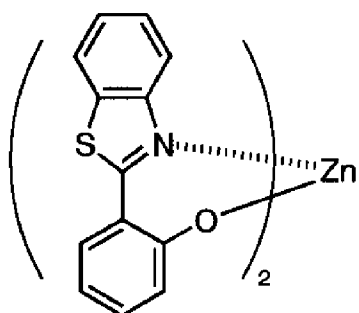
[0126]

[Chemical formula 50]

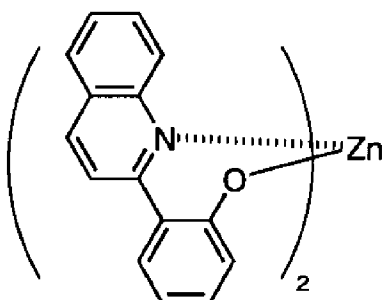
K5



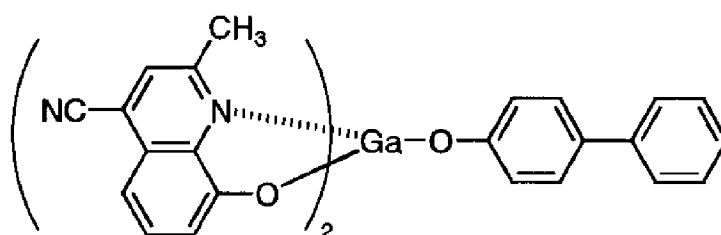
K6



K7



K8



[0127]the compound preferably denoted by general formula (I) - (XV) although the composition

ratio of each material in the case of containing two or more sorts of electronic transportation materials in an above-mentioned electron transport layer does not have limitation in particular - - ten to 90 mass % -- more -- desirable -- 20 to 80 mass % -- it is 50 to 80 mass % still more preferably. It is a case where all the glass transition temperature of the electronic transportation material which it is more desirable, the combination of a not less than 140 ** compound is [glass transition temperature] desirable still more preferred, and at least one sort of glass transition temperature [not less than 130 ** of] of electronic transportation material uses is not less than 140 **. As a formation method of an electronic injection layer and an electron transport layer, a vacuum evaporation method, the LB method, the methods (a spin coat method, the cast method, a dip coating method, etc.) of dissolving or distributing a solvent and coating it with said electronic pouring transportation agent, the ink-jet method, a replica method, an electro photography method, the printing method, etc. are used. In the case of a coating method, it can dissolve or distribute with a resinous principle, and what was illustrated as a resinous principle in the case of for example, the electron hole pouring transportation layer can be applied.

[0128]What is necessary is just to have a function which deters that what promotes element degradation of moisture, oxygen, etc. as a material of a protection layer enters in an element. As the example, In, Sn, Pb, Au, Cu, Ag, aluminum, Metal, such as Ti and nickel, MgO, SiO, SiO₂, aluminum₂O₃, GeO, NiO, CaO, BaO, Fe₂O₃, Y₂O₃, Metal oxides, such as TiO₂, MgF₂, LiF, AlF₃, Metal fluorides, such as CaF₂, polyethylene, polypropylene, poly methyl methacrylate, Polyimide, poly UREA, polytetrafluoroethylene, polychloro-trifluoroethylene, The copolymer of poly dichlorodifluoroethene, chloro trifluoro ethylene, and dichlorodifluoroethene, The copolymer produced by making the monomer mixture containing tetrafluoro ethylene and at least one sort of comonomers copolymerize, the fluorine-containing copolymer which has annular structure in a copolymerization main chain, the water absorptivity substance of 1% or more of percentage of absorption, the dampproof substance of 0.1% or less of percentage of absorption, etc. are mentioned. Also about the formation method of a protection layer, there is no limitation in particular and For example, a vacuum evaporation method, the sputtering method, A reactive sputtering method, the MBE (molecular beam epitaxy) method, the cluster ion beam method, The ion plating method, the plasma polymerizing method (the high frequency excitation ion plating method), a plasma CVD method, a laser CVD method, a heat CVD method, a gas source CVD method, a coating method, the ink-jet method, a replica method, the printing method, etc. are applicable.

[0129]

[Working example]Although a work example is given to below and this invention is concretely explained to it, thereby, this invention is not limited. What produced ITO by a thickness of 150 nm on the work-example 125mmx25mmx0.7mm glass substrate (made by Tokyo Sanyo Vacuum Co., Ltd.) was used as the transparent supporting board. Copper phthalocyanine after etching and washing for this transparent supporting board 5 nm of *****, Next, they are 20 nm (0.001nm/second in vapor deposition speed of the blue luminescent material B.) of ***** about 40 nm of *****, and luminous layer material in the hole transportation material A. 1 nm of ***** were vapor-deposited for vapor codeposition, electronic transportation material (a compound and film thickness are indicated to Table 1), and also LiF under the condition of substrate temperature room temperature in the vacuum of 10^{-3} - 10^{-4} Pa in order at 0.4nm/second in vapor deposition speed of the luminous layer host material C. The mask (mask in which a light-emitting surface product is set to 5 mm x 4 mm) besides patterned was installed, 200 nm of ***** vapor-deposited aluminum, and the element was created. The produced element was closed within the dry glove box. TOYO source major unit 2400 type is used about the produced element, Impress direct-current constant voltage to EL element, it was made to emit light, and the luminosity was measured using Hamamatsu Photonics spectrum analyzer PMA-11 about luminance meter BM-8 of TOPCON CORP. and the luminescence wavelength, and the chromaticity coordinate. The result is shown in Table 1.

[0130]

[Table 1]

表 1

試料 No.	電子輸送材料 (膜厚 nm)	発光波長 λ_{max} (nm)	CIE色度座標 (x,y)	200cd/m ² 発光時の 電圧(V)	外部量 子効率 (%) ^{a)}	経時後外部 量子効率 (%) ^{a)}	備考
101	電子輸送材 K1(36)単層	474	0.18,0.21	12	0.8	0.2	比較例
102	電子輸送材 K2(36)単層	472	0.17,0.20	13	0.7	0.2	〃
103	例示化合物 2(36)単層	460	0.15,0.16	11	1.0	0.3	〃
104	例示化合物 23(36)単層	461	0.15,0.14	10	1.8	0.7	〃
105	例示化合物 24(36)単層	461	0.15,0.15	10	1.9	0.8	〃
106	例示化合物 25(36)単層	462	0.15,0.15	10	1.9	0.9	〃
107	例示化合物 26(36)単層	462	0.15,0.14	10	2.0	1.0	〃
108	例示化合物 43(36)単層	464	0.15,0.16	11	1.2	0.4	〃
109	電子輸送材 K1(18)/電子輸送材 K2(18)積層	473	0.18,0.20	12	0.8	0.3	〃
110	電子輸送材 K1:電子輸送材 K2=50:50(wt%比)(36)単層	474	0.18,0.21	12	0.8	0.3	〃
111	例示化合物 2(18)/電子輸送材 K1(18)積層	461	0.15,0.16	8	2.5	1.8	本発明
112	例示化合物 2(18)/電子輸送材 K2(18)積層	461	0.15,0.16	8	2.6	1.7	〃
113	例示化合物 2(18)/例示化合物 26(18)積層	460	0.15,0.16	7	2.7	1.7	〃
114	例示化合物 23(18)/電子輸送材 K1(18)積層	461	0.15,0.15	5	2.9	2.4	〃
115	例示化合物 23(28)/電子輸送材 K1(8)積層	461	0.15,0.15	5	3.0	2.3	〃
116	例示化合物 23(18)/例示化合物 26(18)積層	461	0.15,0.14	6	3.1	2.3	〃
117	例示化合物 43(18)/電子輸送材 K1(18)積層	464	0.15,0.15	7	2.7	1.9	〃
118	例示化合物 23:電子輸送材 K1=50:50(wt%比)(36)単層	465	0.16,0.17	5	2.3	1.7	〃
119	例示化合物 23:電子輸送材 K1=80:20(wt%比)(36)単層	464	0.15,0.16	6	2.4	1.9	〃
120	例示化合物 23:例示化合物 26=50:50(wt%比)(36)単層	461	0.15,0.15	5	3.1	2.4	〃
121	例示化合物 24:例示化合物 25=50:50(wt%比)(36)単層	460	0.15,0.15	5	3.0	2.5	〃

a) 200 cd/m²発光時の外部量子効率

[0132]After enclosing these elements in the autoclave replaced with argon gas and saving them for bottom seven days of a heating condition of 85 **, the result of having measured the external quantum efficiency at the time of 200 cds / m² luminescence is also shown in Table 1. Mass % is meant wt% among Table 1. From the result of Table 1, when the electronic transportation materials 1 and 2 known conventionally are used independently, blue purity and luminous efficiency are understood that it is bad and endurance is also insufficient. If the compound denoted by general formula (I) is used independently, although blue purity and luminous efficiency will improve, endurance cannot be satisfied enough. On the other hand, blue purity, efficiency, and endurance are known by that a good result is obtained in the element of this invention containing at least one sort of compounds which have two or more sorts of electronic transportation materials, and are denoted by general formula (I).

[0133]About 10 nm of copper phthalocyanines were vapor-deposited on the ITO glass substrate etched and washed like the work-example 2. work example 1. Next, subsequently 40 nm of ***** carried out 30 nm (it is vapor codeposition in 0.4nm/second in vapor deposition speed of compound E of 0.04nm/second in vapor deposition speed of compound D) of ***** vapor deposition of the luminous layer material for the hole transportation material A of the work example 1. Subsequently, 1 nm of ***** were vapor-deposited into electronic transportation material (a compound and film thickness are indicated to Table 2), and LiF was vapor-deposited under the condition of substrate temperature room temperature in the vacuum of 10⁻³ - 10⁻⁴Pa in order. The mask (mask in which a light-emitting surface product is set to 5 mm x 4 mm) besides patterned was installed, 200 nm of ***** vapor-deposited aluminum, and the element was created. The produced element was closed within the dry glove box. The evaluation same about the produced element as the work example 1 was performed. A result is shown in Table 2.

[0134]

[Table 2]

表 2

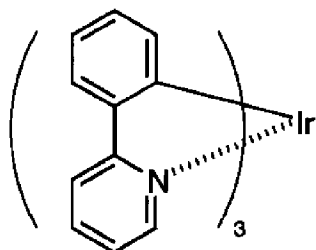
試料 No.	電子輸送材料 (膜厚 nm)	発光波長 λ_{max} (nm)	最高輝度 cd/m ²	1000cd/m ² 発光時の 電圧 (V)	外部量子効率 (%) ^{a)}	経時後外部量子効率 (%) ^{a)}	備考
201	電子輸送材 K1(36)単層	520	12400	12	5.2	2.8	比較例
202	バソクブロン(10)/電子輸送材 K1(26)単層	516	29800	13	8.1	1.5	//
203	例示化合物 2(36)単層	515	26800	12	6.8	2.2	//
204	例示化合物 23(36)単層	514	46200	10	10.2	4.1	//
205	例示化合物 2(18)/電子輸送材 K1(18)積層	515	70300	7	13.4	8.9	本発明
206	例示化合物 23(18)/電子輸送材 K1(18)積層	514	81100	6	18.0	11.3	//
207	例示化合物 2(18)/例示化合物 26(18)積層	515	93000	6	18.8	12.4	//
208	例示化合物 23(18)/例示化合物 26(18)積層	515	87600	6	19.9	12.9	
209	例示化合物 23 : 電子輸送材 K1=50 : 50(wt%比)(36)単層	514	74000	5	16.7	13.3	//
210	例示化合物 23 : 電子輸送材 K1=80 : 20(wt%比)(36)単層	515	76200	6	17.3	13.1	//
211	例示化合物 23 : 例示化合物 26=50 : 50(wt%比)(36)単層	514	71900	5	19.3	13.0	//
212	例示化合物 24 : 例示化合物 25=50 : 50(wt%比)(36)単層	515	90600	5	19.5	13.4	//

a) 200 cd/m²発光時の外部量子効率

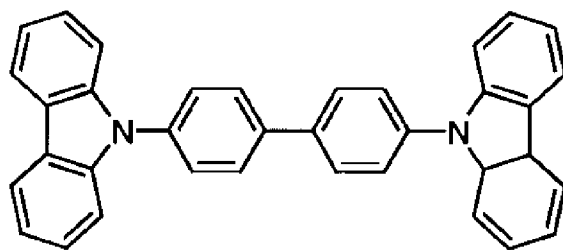
[0135]

[Chemical formula 52]

化合物 D



化合物 E



[0136]Mass % is meant wt% among Table 2. In the element of this invention containing at least one sort of compounds which have two or more sorts of electronic transportation materials, and are denoted by general formula (I) from the result of Table 2, it turns out that a result with good luminosity, luminous efficiency, and endurance is obtained by the system which used the phosphorescence luminescence compound D.

[0137][on the ITO glass substrate etched and washed like the work-example 3. work example 1] After carrying out the spin coat of Baytron P (PEDOT-PSS solution (poly dioxy ethylene polystyrene sulfonate dope object) / Beyer company make), drying by heating was carried out at 100 °C for 1 hour, and the hole pouring layer (50 nm of *****) was constructed. Besides, the spin coat of 40 mg of poly (N-vinyl carbazole) (PVK) and the solution which dissolved compound D 1mg of the work example 2 in 3 ml of 1 and 2-dichloro ethane was carried out (70 nm of *****). Subsequently, an electronic transportation material given in Table 3 was vapor-deposited (a compound and film thickness are indicated to Table 2), and also 1 nm of ***** were vapor-deposited for LiF under the condition of substrate temperature room temperature in

the vacuum of 10^{-3} - 10^{-4} Pa in order. The mask (mask in which a light-emitting surface product is set to 5 mm x 4 mm) besides patterned was installed, 200 nm of ***** vapor-deposited aluminum, and the element was created. The produced element was closed within the dry glove box. The evaluation same about the produced element as the work example 1 was performed. A result is shown in Table 2.

[0138]

[Table 3]

表 3

試料 No.	電子輸送材料 (膜厚 nm)	発光波長 λ_{max} (nm)	最高輝度 cd/m^2	200cd/m ² 発光時の 電圧 (V)	外部量子効率 (%) ^{a)}	経時後外部量子効率 (%) ^{a)}	備考
301	電子輸送材 K1(36)単層	520	4800	14	4.1	1.6	比較例
302	バソクブロン(10)/電子輸送材 K1(26)単層	516	6800	15	5.9	1.1	〃
303	例示化合物 23(36)単層	514	8200	13	7.8	3.3	〃
304	例示化合物 23(18)/電子輸送材 K1(18)積層	515	12300	9	9.3	7.2	本発明
305	例示化合物 23(18)/電子輸送材 K1(18)積層	514	14100	9	10.0	7.8	〃
306	例示化合物 2(18)/例示化合物 26(18)積層	515	26000	8	11.5	9.4	〃
307	例示化合物 23(18)/例示化合物 26(18)積層	515	28900	8	12.3	10.1	〃
308	例示化合物 23 : 電子輸送材 K1=50 : 50(wt%比)(36)単層	514	15300	7	9.6	7.4	〃
309	例示化合物 23 : 電子輸送材 K1=80 : 20(wt%比)(36)単層	515	15900	8	10.3	8.0	〃
310	例示化合物 23 : 例示化合物 26=50 : 50(wt%比)(36)単層	514	24400	7	11.3	9.2	〃
311	例示化合物 24 : 例示化合物 25=50 : 50(wt%比)(36)単層	515	25200	7	11.5	9.3	〃

a) 200 cd/m² 発光時の外部量子効率

[0139]Mass % is meant wt% among Table 3. In the element of this invention containing at least one sort of compounds which have two or more sorts of electronic transportation materials, and are denoted by general formula (I) from the result of Table 3, luminosity, luminous efficiency, and endurance are known by that a good result is obtained also in the element which produced the luminous layer by the applying method.

[0140]Li was vapor-deposited instead of LiF of sample No.206 which can set the work-example 4. work example 2, and the element was produced. As a result of performing the same evaluation as the work example 2, as for 515 nm and the highest luminosity, as for luminescence wavelength λ_{max} of this element, the performance which the drive voltage at the time of 186000cd/m^2 and 1000cd/m^2 luminescence was excellent in 5V with 13.9%, and was [external quantum efficiency] excellent in the external quantum efficiency after temporality 20% was obtained.

[0141]2-NAFTA RENKARUBON Li salt was vapor-deposited instead of LiF of sample No.206 which can set the work-example 5. work example 2, and the element was produced. As a result of performing the same evaluation as the work example 2, as for 515 nm and the highest luminosity, as for luminescence wavelength λ_{max} of this element, the performance which the drive voltage at the time of 148000cd/m^2 and 1000cd/m^2 luminescence was excellent in 5V with 13.1%, and was [external quantum efficiency] excellent in the external quantum efficiency after temporality 19.8% was obtained.

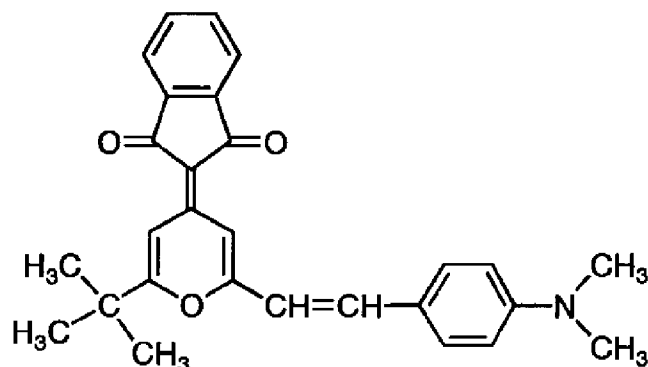
[0142]It is a vapor codeposition layer (0.001nm/second in vapor deposition speed of the compound F.) of the compound F and the compound G instead of the luminous layer material (blue luminescent material B+ luminous layer host material C) of sample No.121 which can set the work-example 6. work example 1. 20 nm of film thickness attached 0.4nm/second in vapor deposition speed of the compound G one by one so that it might become subsequently to 20 nm of film thickness about the vapor codeposition layer (0.4nm/second in vapor deposition speed of the compound C of 0.001nm/second in vapor deposition speed of the compound B) of the compound B of the work example 1, and the compound C. Other element production was performed like the work example 1, and produced the element. The CIE chromaticity coordinate of this element showed white luminescence of = (x, y) (0.32-0.32), and indicated

good white luminescence to be highest luminosity 10400cd/m^2 and 3.0% of external quantum efficiency.

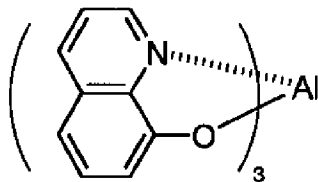
[0143]

[Chemical formula 53]

化合物 F



化合物 G



[0144]

[Effect of the Invention] After the element of this invention shows high luminescence luminosity and luminous efficiency and carries out high temperature preservation about preservation endurance, there is also little decline in luminous efficiency, and endurance is improved sharply. The same effect is acquired also in an applied type element with usually low luminous efficiency.

[Translation done.]